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CSIR and Iraq's CSR enter into S&T cooperation agreement

The Council of Scientific and Industrial Research (CSIR) entered into an agreement with Council for Scientific Research, Iraq, providing for mutual cooperation in science and technology for a two-year period 1983-1984.

The R&D areas covered under the agreement for cooperation include building research, ionospheric and cosmic ray research, electronics, pharmacology, drug evaluation, and petroleum research. The agreement also envisages the setting up of pilot plants in Iraq, training Iraqi technicians in India, and making available Indian expertise for short durations.

The memorandum was signed by Dr I.B. Gulati, Director, Indian Institute of Petroleum, Dehra Dun, and Dr Mohammed Ayoub Elizzi, Director General, Building Research Centre, Baghdad, in New Delhi on 29 December 1982. □

Workshop on Support of Freshly Exposed Roof in Mines

A workshop on Support of Freshly Exposed Roof in Mines organized jointly by Central Mining Research Station (CMRS), Dhanbad, and Directorate General of Mines Safety (DGMS), Dhanbad, at CMRS on 6-7 November 1982, reviewed the technical aspects in the application of several support systems. These included safari support screw prop, triangular chocks, and various types of roof bolts all of which CMRS has developed.

Roof fall accidents are responsible for a majority of fatal accidents in mines. About 70% of the accidents occurs within 9 m zones of the freshly exposed roof. The conventional supports get dislodged during blasting and the working face in the mines near the freshly exposed roof will remain practically unsupported.

The fifth conference on Safety in Mines held in December 1980 had recommended that with effect from July 1982 no worker shall be permitted to work under unsupported roof which has been freshly exposed. At the instance of DGMS, CMRS took up in 1979 work on development of effective supports for freshly exposed roof.

The workshop provided an excellent forum for the industry to interact with CMRS and DGMS, the enforcing authority for mines safety.

Over 250 delegates from coal and non-coal mining companies, and mining equipment manufacturers, besides CMRS and DGMS, attended the workshop. The two sponsoring organizations presented papers on analysis of roof fall accidents and the quick-setting supports developed for the freshly exposed roof. The coal companies presented papers on the status of implementation of quick-setting supports and their experiences. The manufacturers and CMRS presented

Signing the memorandum of understanding for cooperation in science and technology between CSIR and its Iraqi counterpart are Dr Mohammed Ayoub Elizzi (left) and Dr I.B. Gulati. To the left of IIP Director is Dr G.S. Sidhu, Director General, CSIR. The function was held at CSIR Headquarters, New Delhi, on 29 December 1982.

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papers on the development of bolting systems for immediate support. There were a few papers on the application of bolting for immediate support in coal and non-coal mines.

The concluding session discussed the recommendations of the working groups constituted for coal and non-coal mines. Some of the important recommendations:

Immediate steps should be taken to keep the 9m zone systematically supported by types of support systems that will not easily get dislodged owing to blasting at the face. Formation of four-way junctions in bord and pillar workings should be avoided as far as possible in all mine layout plans.

In view of the recent developments in the techniques of roof bolting in coal-mines and depleting reserves of timber, DGMS may consider approval of different roof bolting systems like inorganic grouted bolts, full-column resin bolts, and recoverable-type bolts under appropriate conditions as means of support of freshly exposed ground and permanent support of roadways where systematic supporting is considered necessary.

In order to facilitate adoption of roof bolting systems, mechanized roof bolting machines should be indigenously manufactured. Whereas for most conditions, light hydraulic drills mounted on column may be adequate, mobile roof bolting machines will be required for highly mechanized districts. Until such machines are available in the country, some units may be imported.

The industry should appoint strata control engineers for designing and monitoring different support systems to be adopted in mines for support of freshly exposed ground as well as permanent roadways.

Mechanized extraction of developed pillars may require adoption of roof bolting in conjunction with other support systems to the extent necessary. Any such scheme should be tried out only with proper control and scientific monitoring of the strata behaviour.

A steering committee may be set up to provide a common forum for users, manufacturers and all concerned institutions and authorities for planning, development, manufacture of equipment, quality control, and review of the progress in the adoption of different support strategies and systems and to make suitable recommendations from time to time. □

CSIR-FICCI Get-together on Pesticides

A joint meeting of scientists from CSIR laboratories and representatives of the Federation of Indian Chambers of Commerce and Industry (FICCI) on Pesticides was held on 17 November 1982 at the Regional Research Laboratory (RRL), Hyderabad. Twenty-nine representatives from CSIR and as many from FICCI participated in the meeting, which was the outcome of a series of dialogues and discussions initiated by Dr G.S. Sidhu, Director General of CSIR, with the Federation.

Dr G. Thyagarajan, Director, RRL-Hyderabad, in his welcome address, explained how pesticides came to be identified as one of the areas where there could be close collaboration between the CSIR laboratories and the industry. He also spelt out the ways and means by which the laboratories could assist the industry.

Dr Sidhu, in his address, stated that the CSIR had established and demonstrated its capability in generating technologies, designs, formulations and data covering toxicology and bioefficacy and effluent treatment in the area of pesticides. The past activities and the current programmes in pesticides at RRL-Hyderabad, RRL-Jammu, and National Chemical Laboratory (NCL), Pune, were presented to the invitees. This was followed by discussions. Emerging out of discussions were the following recommendations:

There is a need to undertake a forecasting exercise to identify pesticides that may be required during the next 10 years, and also to develop know-how for such pesticides.

To strengthen the indigenous base of the pesticide industry, schemes for pesticide production planning may be formulated in such a way that several pesticides are produced in the same plant.

A programme may be initiated on the collection of chemical and activity data on the new compounds synthesized in the various universities in India and which are likely to have pesticidal activity. Suitable arrangements may also be made for getting the likely candidates tested for pesticidal activity either in research laboratories or in other institutions.

In view of the time-consuming procedure for registration of even a known pesticide, it was suggested that (i) a more simplified procedure, including the amount and type of data required for registration (within the provision of the Insecticides Act) should be worked out, and (ii) changes be made in the Insecticides Act to get round the hurdles in the registration of pesticides. □

Cadmium sulphide solar cells

Development of CdS-Cu_xS solar cells is engaging the attention of scientists all over the world as these have advantages over the other types of solar cells in cost and ease of making large-area cells. The CdS layer can be deposited onto a conducting substrate by vacuum evaporation, spray pyrolysis, or screen printing and subsequent sintering of the layer.

Because of its economy the last is the most favoured one, and Central Electrochemical Research Institute, Karaikudi, is also paying attention to it. One snag in the method is, however, that the sintered layers have high electrical resistivity, and the entire success of fabrication of solar cells by this method therefore hinges on reducing the resistivity of sintered layers of CdS. The institute has overcome this drawback by developing a technique for bringing down the resistivity of the sintered CdS

layers from 10^8 ohm-cm to about 1 ohm-cm. The technique consists in annealing the sintered CdS layer in vacuum of 10^{-5} torr at a temperature around 600°C.

The technique is simple, and reproducible results on the thickness of CdS layer before and after sintering have been obtained. It is also elegant and economical, and does not pose any pollution problem.

Further studies are in progress to develop a non-degradable *p*-layer on the CdS *n*-layer. □

A novel theory of electrolyte solutions

One of the important goals of the theory of electrolyte solutions has been the calculation of some of the fundamental thermodynamic properties of ions in solution from the first principles. Over the last 50 years or so, many workers have tried to reach this goal often with the help of various models—solvent continuum models, molecular models, statistical and quantum mechanical models, hybrid models, and so on. With the development of sophisticated computer systems in recent years, various simulation techniques have also been tried, and scientists are resorting to complicated computer programmings with more and more variable parameters, often arbitrary.

Dr Utpal Sen of Central Electrochemical Research Institute, Karaikudi, has proposed a strikingly simple electrolyte solution theory which avoids complicated computations and at the same time is capable of making very accurate theoretical predictions of the thermodynamic behaviour of ions and electrolytes in aqueous and nonaqueous solutions at different temperatures. The essential feature of the theory is that it proposes that the interactions in the vicinity of an ion in solution are sufficiently strong and the energy involved is relatively temperature-insensitive.

The theory does away with the method of adopting arbitrary adjustable parameters which almost all the earlier workers needed to make their proposals presentable, but could not achieve much success in representing the experimental phenomenon.

Among the other significant features of Dr Sen's theory is its capability of easily avoiding the approximation arising out of the assumption of symmetry between the anions and cations in solutions.The theory also gives a definite lead to solve the persistent problem of dividing the electrolyte solution properties into the corresponding anionic and cationic contributions at room as well as elevated temperatures.

Moreover, high-temperature data of aqueous electrolytes are now very important in the growing geothermal researches and it would take years to experimentally determine these data. The new unified theory provides one with the means of accurate theoretical estimation of those data without doing experiments.

Thus one can at the same time dispense with the nagging association of adjustable parameters, bid at least a temporary farewell to sophisticated computers and forget about doing numerous, lengthy and time-consuming experiments in the laboratory and still can generate accurate basic thermodynamic data of electrolytes and ions at a very wide range of temperatures between the normal freezing and the critical temperatures. This has never been achieved before.

Dr Sen, who has been working in the field of electrolyte solutions both in India and abroad for some years, was awarded D.Sc. degree in chemistry by Calcutta University for his thesis based on the study. □

Organotitanium (IV) and organotin (IV) compounds and sulphur dioxide insertion reactions in related compounds

Synthesis of some coordination compounds of titanium(IV) and tin(IV), and also the sulphur dioxide insertion reaction in related compounds, have been studied by Shri S.K. Pandit of the Inorganic Chemistry Division of National Chemical Laboratory, Pune.

5-Chloro- and 5-bromo derivatives of S-benzyl-β-N-(2-hydroxyphenyl)methylen dithiocarbazate ($L'H_2$) reacted with titanium tetrachloride to give $(L'H)TiCl_3$. Similarly, stable compounds were obtained with chelated titanium alkoxides, stannic chloride and alkyl/aryl tin oxides/hydroxides. Titanium-tetraisopropoxide reacted with N,N'-ethylene-bis-salicylideneimine ($L''H_2$) to give $(L'')Ti(OPr)_2$.

Reactions of benzoylphenylhydroxylamine and saligenin derivatives of chelated titaniums resulted in coordination rearrangements in the titanium complex without any ligand exchange. Stannic chloride and aryl/alkyl tin chlorides and sodio derivative of saligenin formed new tin compounds of the dihydroxy ligand.

Compounds with Ti-O-Sb bonds were obtained by the condensation of bis-chelated titanium diisopropoxide with triphenylantimony dihydroxide. Similarly, successful attempts were made to introduce Ti-C bonds into the chelated titanium compounds. For example, lithium phenyl and bis-chelated titanium dichloride reacted with the elimination of lithium chloride and formation of bis-chelated titanium diphenyl.

Insertion of SO_2 into chelated organometallic compounds (with M-C bonds) could be effected in the case of mercury, tin, lead and titanium, the products being identified as O-sulphinates. Insertion always took place between the metal and the carbon and not between the metal and the chelate.

Shri Pandit, who carried out the studies under the guidance of Dr C. Gopinathan of NCL, was awarded Ph.D. degree by Poona University for his thesis based on the study. □

PROGRESS REPORTS

SERC Annual Report: 1981-82

The major fields of research at Structural Engineering Research Centre (SERC), Roorkee, according to its annual report for 1981-82, continued to be: high-rise buildings, large-span structures, tunnelling and underground structures, and computer software for civil engineering applications. The centre concluded the project on the application of ferrocement technology for rural development with the development of several types of roofing units and a semi-mechanized process for casting them. Also developed were light- and medium-duty manhole covers, and components for fabricating biogas plant digesters with cylindrical ferrocement elements. Similar units were also used for constructing water tanks of up to 20,000-litre capacity and grain storage bins of up to 16-tonne capacity. The laboratory's process on casting of ferrocement cylindrical units was released to six more parties; two firms were already in production.

SERC continued tests on the elastomeric bearings with a view to establishing the suitability of indigenous natural rubber for these bearings. On the basis of R&D work carried out by the centre on these bearings, the Union Ministry of Shipping and Transport has recognized SERC as one of the laboratories for testing such bearings. Facilities were being developed for carrying out special tests like ozone resistance, low-temperature stiffness, and accelerated aging.

A programme package was developed for linear static analysis of uniaxial structures and a user manual was under preparation. A comprehensive subroutine pack for matrix operation for economizing core usage and cutting down computation time was in an advanced stage of development. Two general-purpose programme packages, one for the linear elastic analysis of structures subjected to static, dynamic and thermal loads and the other for non-linear analysis of structures subjected to static and dynamic loads, were implemented on the DEC 2050 system. A preprocessor was also developed for the second package.

The utility of SERC-developed methods of analysis of tall buildings was demonstrated in the case of a 15-storyed building; in comparison with the conventional analysis, the SERC's approach resulted in a saving of 40% steel in columns and an overall saving in beam.

An analytical investigation on the design of box girder free cantilever bridges was completed. Laboratory studies were undertaken to investigate the fatigue characteristics of composite bridge decks comprising steel beams and concrete decks.

To meet a user demand the centre took up work on the design of non-rectangular reinforced concrete sections with particular reference to columns. The programme includes the study of normal and reverse bending about both principal axes for six different types of non-rectangular sections chosen after in-depth discussions with experts in this field. SERC would also be taking up the development of computer software for the analysis, design and estimation of certain types of water tanks. In the first part, approximate analysis, design and estimation will be carried out and the second will relate to corrections owing to moments and resultant changes. The availability of these programmes would help rationalize the design of overhead water tanks to a large extent. An exact analysis of shell-type water tanks had already been made by the centre during the previous year.

Thirteen papers were published during the period covered under the report. □

International Seminar on Determination of Priorities in Science and Technology: Proceedings

The National Institute of Science, Technology and Development Studies, New Delhi, has brought out the proceedings of the Unesco-CSIR sponsored international seminar on the title topic held in New Delhi in April 1980. The main objective of the seminar was to test the Unesco-developed methodology for determining priorities in science and technology, taking the Indian example of planning. Particular attention was paid to priorities in manpower, agriculture, industry, natural resources, and energy. The consensus of the participants was that the Unesco methodology was a useful tool for planning science and technology.

The proceedings contain informative addresses by Prof. A. Rahman, Dr V.G. Podoinistin, Prof. M.G.K. Menon, and Prof. S. Nurul Hasan—addresses which provided background material for the panel discussions in various fields of S&T which followed. The publication (pages 240; edited by V.N. Vashist) is available on writing to Prof. A. Rahman, Director, NISTADS.

For a brief report of the seminar, see *CN*, 30 (1980), 81-82. □

EXTRAMURAL RESEARCH

Solar activity and structural changes in lower ionosphere and middle atmosphere

In a CSIR research scheme granted to him, Dr K.M. Kotadia, Professor in the Physics Department of Gujarat University, Ahmedabad, has investigated the structural changes in the lower ionosphere and the middle atmosphere during high solar activity years. Principal findings of the three-year study, which concluded in October 1982, are set out below.

The absorption of radio waves in the SW band during the solar eclipse of 16 February 1980 reduced to one-half of its normal value following the maximum phase (75% at Ahmedabad, i.e. one-fourth of the optical solar disc open) of the eclipse with a time delay of about 18 min. The shapes of fall and recovery of absorption were not similar and they

were also not identical with those of the progress and degrees of the eclipse. The field-strength of 11.8 MHz radio signals received from Colombo rose to almost the same value during maximum phase as that normally observed near sunset time. The reflection point of these signals lay in the totality belt of the eclipse at the time of maximum phase. The results have been interpreted in the context of the changes in the ionizing radiation, electron density profile, recombination rate, and deviative plus nondeviative components of absorption.

Another interesting study concerned the electron density profiles as derived from ground-based methods and those given by theoretical models as well as by rocket-borne measurements. It has been suggested that the International Reference Ionosphere (IRI) model should give due weight to seasonal and solar cycle variations of atmospheric parameters at different latitudes when a revision is made. Langmuir probe rocket measurements also need to be reexamined and corrected.

Another study on tides showed that the phases of lunar tidal variation of ionospheric absorption at the tropical latitude agreed in phase with the global semidiurnal/semi-monthly lunar tide in atmospheric pressure at ground level. The implication drives to a crucial point on the influence of meteorological disturbances in the mesosphere. This is being further investigated in detail.

Finally, it was possible to study and sort out differences in some aspects of ionospheric absorption at low and middle latitudes. Mainly, the time-delay in the solar diurnal variation of absorption is anti-correlated with the index of its variation with solar zenith distance, and there is good correlation of absorption with solar activity, with the exception of seasonal anomalous values of absorption in both the correlation studies.

A CSIR research fellow, Smt. Gopa Datta, was associated with the research project.

Aquatic fungi and fish diseases

In a CSIR research scheme granted to him, Dr R.D. Khulbe, Lecturer in Botany, Kumaun University, Nainital, and his team have isolated a number of aquatic fungi belonging to Blastocladiales, Saprolegniales, and Peronosporales from infected fish and fish eggs. The researchers were looking for the presence of fungal infections in many fish species and their eggs found in ponds, lakes, streams, and rivers in the Kumaun Himalayas. Inoculation experiments in the laboratory showed that all the isolated pathogens were able to parasitize fishes, causing death of hosts.

Among the isolates, *Protoachlya paradoxa*, *Pythium undulatum*, *Thraustotheca clavata* and *Achlya klebsiana* are reported for the first time as fish parasites in natural conditions. Similarly, *Allomyces arbuscula*, *Brevilegnia diclina*, *Leptolegnia caudata*, *Pythium afertile*, and *Saprolegnia diclina* are recovered as new parasites of the fish eggs. Almost all the hosts examined are new.

Three fungi, viz. *B. diclina*, *L. caudata* and *Protoachlya paradoxa*, are new records for the Indian aquatic fungi. Four pathogens, *Achlya prolifera*, *A. americana*, *S. diclina* and *S. parasitica*, studied for their host range, were able to parasitize the fish without any host specificity.

Of the many chemicals tested for controlling fish diseases, boric acid (0.25%), Malachite Green (0.00006%), potassium chromate (0.1%), and potassium permanganate (0.03%) were suitable.

Two CSIR research fellows worked in the scheme: Shri S.C. Sati (July 1979 to Feb. 1981) and Shri B.L. Verma (June 1981 to July 1982), and Shri Sati earned his Ph.D. degree from Kumaun University for his thesis based on the study.

* * *

Rheological characteristics of Indian pulses

Because of the inadequate design of milling systems there are considerable losses (10-20%) of pulse grains in India. To put the design of *dal*-milling systems on a rational footing is the basic aim of a CSIR research scheme being investigated at the Department of Agricultural Engineering, College of Technology, G.B. Pant University of Agriculture and Technology, Pantnagar. The principal investigators are Prof. B.P.N. Singh and Shri Ram Krishna Pandey, a CSIR Scientists' Pool researcher.

The findings of the proposed research work are expected to be of use for optimum design of *dal*-milling machines which would improve the total *dal* recovery and reduce losses to the minimum.

In this study, the rheological characteristics of pulses would be studied in relation to the grain type and variety, moisture content, orientation, pretreatment, size, and rate of loading on an Instron machine. Black gram (*urad*), pigeon pea (*arhar*), and Bengal gram (*chana*) would be studied as this group represents the pulse grains commonly used for *dal*-making in India. The theoretical energy required for splitting or rupturing the grain, apparent modulus of elasticity and toughness of the grain would be evaluated from load deformation tests, and brittleness of grains, from shear tests. On the basis of the results the optimum grain-machine parameters for designing effective milling systems would be worked out. A prediction model for correlation of rheological characteristics would also be developed. □

CONFERENCE BRIEFS

International Symposium on Carbon

Interest in carbon and carbon technology has reached a peak in the last ten years or so. The main interest centres on the preparation of needle cokes from coal-tar pitches and the preparation of carbon fibres. Dr O.P. Bahl of the Carbon Technology Unit of National Physical Laboratory (NPL), New Delhi, who attended, on an invitation from the

Japanese Carbon Society, the international symposium on Carbon, held at Toyohashi, Japan, 1-4 November 1982, reports:

The symposium reviewed the progress in the various fields of carbon in eight plenary lectures by experts drawn from all over the world. One of the significant developments reported was the commercialization, by Union Carbide, USA, of pitch-based carbon fibres with elastic moduli ranging from 25×10^6 to 100×10^6 psi. Although polyacrylonitrile (PAN)-based carbon fibres have already been proven to be highly desirable in high-performance composites for aerospace and other such applications, pitch-based carbon fibres, because of their low price and certain characteristics, are entering into a variety of new applications. Carbon fibres have been made by thermally decomposing hydrocabons and these carbon fibres possess properties similar to those of graphite whiskers. The vapour-grown carbon fibres have been used for making a variety of intercalation compounds, which are now being used for very fascinating applications like high-energy density lithium batteries.

Carbon-carbon composites are being used for newer applications, both in engineering and biomedical areas. Dental implants of carbon-carbon composites have been very successful. Carbon in its various forms represents a well-established implant material for many endoprosthetic devices. More than 400,000 components of carbon for heart valves have already been implanted. Carbon materials developed for constructing hip joints were shown at the conference. Almost all new aeroplanes have brake-shoes made of carbon-carbon composites, and such brake-shoes have proved to be more reliable, possessing as they do longer life than the conventional ones.

Several papers relating to pitch processing, modification, etc. were presented. Hot-stage *in situ* microscopy was shown to be a powerful tool in studying mesophase nucleation, growth, coalescence, and appearance of bulk mesophase. The properties of the mesophase pitch, such as its molecular weight and distribution and rheological properties, play a significant role in determining the strength of the ultimate carbon product. Many papers described the development of needle cokes from coal tar. There is a worldwide shortage of calcined petroleum coke and at the same time consumption of high-power electrodes is ever increasing. Hence the importance of needle coke from coal tar.

Presentations in the area of coal gasification and liquefaction testified to the increasing renewal of interest in this area in the wake of energy crisis.

One of the important features of the symposium was the poster session wherein several newer carbon artifacts were displayed. These included needle pitch coke from coal tar, high-density isotropic graphite, carbon springs, cheap silicon carbide whiskers, and supreme coke.

The NPL scientist presented two papers. One dealt with the chemical modification of PAN fibres from the point of view of carbon fibre development. The other dealt with the modification of high-modulus carbon fibre surfaces and their influence on the carbon fibre-reinforced epoxy composites. Dr Bahl also chaired a session.

* * *

International Symposium on Soil and Rock Improvement

Dr R.K. Bhandari of Central Building Research Institute (CBRI), Roorkee, participated in the international symposium on Soil and Rock Improvement Techniques including Geotextiles, Reinforced Earth and Modern Piling Method held in Bangkok, Thailand, from 29 November to 3 December 1982. Attended by more than 200 delegates, the symposium discussed the latest trends in the techniques of ground improvement with focus on stone columns, geotextiles, lime piles, reinforced earth, micropiles, and other upkeeping techniques, reports Dr Bhandari.

Dr Bhandari made a presentation on 'Failures in cast-in-place piles', projecting a gist of design failure case records studied by CBRI during the last two decades. The geotechnical behaviour and statistical correlations peculiar to the Indian marine clays constituted the first part of the lecture, which showed the sharp contrast in behaviour between these clays and similar clays elsewhere in the world. In the second part of the lecture, the CBRI scientist established, through the case records, that driven cast-in-place piles constitute an inappropriate choice, particularly in dealing with deep deposits of soft clays.

The other delegates from India presented Indian work on ground improvement with stone columns, reports the CBRI scientist. □

DEPUTATION/CONFERENCE BRIEFS

Dr P.K. Seth as visiting professor at University of North Dakota

Dr P.K. Seth of Industrial Toxicology Research Centre (ITRC), Lucknow, on invitation, worked as Visiting Professor at University of North Dakota, Grand Forks, USA, on a collaborative research scheme in the Department of Physiology from 25 July to 15 October, 1982. Dr Seth's research was aimed at elucidating the role of neurotransmitters in the action of environmental pollutants and drugs affecting the central nervous system activity. He investigated the interaction of acrylamide, mercury and methylmercury with some psychopharmacological agents on neurotransmitter receptors. In collaboration with Prof. Edwin C. James of the Department of Surgery and Prof. Surendra S. Parmar of the Department of Physiology, Dr Seth also studied the activity of neurotransmitter receptors in human lungs using a high-affinity receptor-binding screen (developed by him and his colleagues at ITRC). The researchers observed that sensitivity of α- and β-adrenergic, dopamine and serotonin receptors of lung synaptosome of patients of squamous cell carcinoma, malignant

melenoma and adenocarcinoma decreased. The involvement of neurotransmitters in lung disorders, as suggested by this study, might be useful in the management of therapy of such patients and cases of lung carcinoma induced by occupational and environmental chemicals. A paper embodying the results of the study was presented at the conference on Receptors and Chronic Obstructive Lung Diseases held at Leusden, The Netherlands, 4-6 November 1982.

Participating, also on invitation, in the international conference on Neurotoxicology of Selected Chemicals held at Chicago, USA, 20-24 September 1982, Dr Seth delivered an invited lecture at the symposium on Manganese Neurotoxicity and was member of a discussion panel. The ITRC scientist also delivered invited lectures at North Dakota, State University, Fargo, and University of Tennesse, Memphis. On his way back, Dr Seth attended the 55th annual meeting of the Japanese Biochemical Society, held at Osaka, Japan, 10-12 October 1982, where he presented a research paper. □

PERSONNEL NEWS

Appointments/Promotions

At Central Institute of Medicinal and Aromatic Plants (CIMAP), Lucknow, Shri P.K. Chaudhuri has been appointed Scientist B (6 Sep. 1982) and Shri Pradeep Kumar has been appointed, on promotion, Scientist B (27 Sep. 1982). Also at CIMAP, the following have been promoted, consequent on assessment, to the level Group III (3): Shri K.K. Agarwal, Dr Sunil Kumar, Dr V.K. Kaul, Shri A.S. Shawl, Dr E. Muralikrishna, Dr Mansoor Alam, and Dr Anup Kumar (all from 1 Feb. 1981).

* * *

At Regional Research Laboratory, Jammu, the following have been promoted consequent on assessment:

As Scientist C

Dr S.C. Puri (30 July 1982) and Dr R.K. Thappa (1 Aug. 1982).

As Scientist B

Shri M.L. Sharma, Shri V.K. Vakhlu, Smt P. Somal (all the three from 1 Feb. 1981), Shri P.S. Johar (1 Dec. 1981), Shri Alimulla Khan, Dr R.K. Johri, Shri H.K. Bhat, Dr R.K. Raina, Shri J.K. Dhar, Shri J.M. Upadhayay (all the six from 1 Feb. 1982), and Shri Bhupinder Singh (1 July 1982).

As Technical Officer A

Dr Mukesh Mohan (1 Aug. 1981) and Shri A.K. Gupta (17 Aug. 1981).

* * *

At Central Electrochemical Research Institute (CECRI), Karaikudi, Shri M. Kamaludeen and Shri R.M. Krishnan have been appointed, on promotion, Scientists B (both from 16 Sep. 1982).

Promoted on assessment at CECRI are: As Scientist C—Shri T.R. Venkatasubramanian (31 March 1979), Shri K. Nagaraja Rao (12 June 1980), Shri K. Narayanan, Shri J. Kuppusamy, and Shri N. Rajaram (all three from 25 Jan. 1981) and Shri T.M. Balasubramanian (12 June 1981). As Scientist B—Shri K. Naganathan (20 Oct. 1979), Shri V. Lakshminarasimhan (3 July 1980), Shri G.N. Kannan (28 Feb. 1981), Shri B. Sathianadam (19 Jan. 1981), and Shri S.M. Sukumaran (20 Aug. 1981). As Scientist A—Shri S. Balagopalan (4 May 1978), Shri V. Dhuruvan (3 July 1978), Shri N.S. Srivastava (28 Feb. 1979), Shri R. Palanichamy (15 July 1980), Shri M. Hariharan and Shri K. Natarajan (both from 19 Oct. 1980), Shri V. Chandrasekaran (18 Nov. 1980), Shri D. Kanagaraj (1 Dec. 1980), and Shri G. Raghavan (30 Jan. 1981).

* * *

At National Chemical Laboratory (NCL), Pune, Shri G. Venugopalan has been appointed Scientist C (28 July 1982). Also at NCL, the following have been promoted consequent upon assessment: Shri A.B. Bastawade (as Scientist C, 15 Feb. 1980), Dr V.H. Deshpande (as Scientist C, 1 Oct. 1980), Shri S.G. Patil (as Scientist C, 11 May 1981), Shri I.S. Mulla (as Scientist B, 9 Oct. 1979), Smt. D. Srivastava (as Scientist B, 24 Feb. 1981), and Shri V.K. Bhalerao (as Scientist B, 11 May 1981).

At National Geophysical Research Institute, Hyderabad, the following scientists have been promoted, on assessment, from Scientist B position to Scientist C position: Dr B.S. Rathor (19 Feb. 1982), Shri S. Venkatachalam, Dr D.V. Subba Rao, Dr G.S. Mital (all three effective 25 Feb. 1982), Kum. M. Kousalya (14 April 1982), and Shri B.S.P. Sarma (28 July 1982). Also at NGRI, Shri Ch. V. Ramakrishna Rao, Senior Scientific Assistant, has been appointed Scientist B (30 Sep. 1982).

* * *

At Structural Engineering Research Centre, Madras, the following have been promoted, on assessment, to the position Scientist C with effect from dates given in parenthesis: Shri T. Narayanan (19 Dec. 1980), Shri J. Shanmugasundaram, Shri Thandavamoorthy, Shri R. Jayaraman (all three from 28 Jan. 1982), Shri M.S. Sabesan (3 Feb. 1982), Shri S. Seetharaman (10 Feb. 1982), and Shri M. Armugam (5 March 1982).

Dr R. Narayanan

Dr R. Narayanan, of Structural Engineering Research Centre (SERC), Madras, has been appointed, on promotion, Scientist EI (17 Nov. 1982).

Dr Narayanan (born 12 June 1941) obtained his Ph.D. in experimental mechanics from Illinois Institute of Technology, Chicago, USA (1981). He was a fellow at Centre for Advanced Engineering Study, Massachusetts Institute of Technology during 1974-75. Earlier, he obtained his M.E. in structural engineering with honours (1971) from University of Roorkee.

With SERC since 1966, Dr Narayanan has been engaged in research and consultancy in stress analysis of shells, folded plates, nuclear containment vessels, high-rise buildings, and towers. In his doctoral research he combined holographic interferometry with Moire effect thereby improving the sensitivity and accuracy of these techniques. He has also improved an optical technique for determining stress in thin films.

A recipient of Sahu Cement Service Award in 1968, he has two handbooks and about 25 papers to his credit. He is a fellow of Optical Society of India, member of Institution of Engineers (India) and of Society of Experimental Stress Analysis, and second editor of *Journal of Structural Engineering*. □

Honours & Awards

Three awards to NCL scientists

Dr N.R. Ayyangar, Dr R.A. Mashelkar and Dr B.D. Kulkarni of National Chemical Laboratory (NCL), Pune, have been selected for the Indian Merchants' Chamber Award, Herdillia Award, and Amar Dye-Chem Award respectively.

The Indian Merchants' Chamber Diamond Jubilee Endowment Trust's Amar Dye-Chem Limited award to be made to Dr Ayyangar of NCL's Process

Development Division is for his 'outstanding R&D work and contributions to the dyestuff and other chemical industries'.

The Herdillia Award, administered by the Indian Institute of Chemical Engineers (IIChE), to Dr Mashelkar,

head of NCL's Chemical Engineering Division, is for 'excellence in basic research in chemical engineering' for the year 1982.

The Amar Dye-Chem Award, also administered by IIChE, to be given to Dr Kulkarni of NCL's Chemical

Engineering Division, is for 'excellence in research and development in chemical engineering' for the year 1982.

* * *

Usha Zutshi and J.L. Kaul of RRL-Jammu win IDMA award

The paper entitled 'The impact of Ayurvedic herbals on drug bioavailability' by Usha Zutshi and J.L. Kaul of Regional Research Laboratory, Jammu, published in *Indian Drugs*, 19 (1982), 476-79 has been selected for the Indian Drug Manufacturers Association's Research Award for 1981-82 in the discipline of pharmacology.

The study has shown that *trikatu*, the three acrids comprising black pepper, long pepper and ginger of the Ayurvedic system of medicine, influences the bioavailability of the drug with which it is administered. Piperline, the active principle of both *Piper nigrum* and *P. longum* shows maximum efficacy. Under the influence of this principle (40 mg/kg) the area under the drug increased three-fold. Quantitatively there was more than 300% increase in bioavailability of vasicine even on oral feeding. The significance of the finding is that the improved bioavailability through oral route could eliminate the need to administer the drug by more painful parenteral routes, in turn eliminating the risk of hypersensitivity.

NOMINATIONS INVITED

Shanti Swarup Bhatnagar Prizes in Science and Technology for 1983

Nominations are invited by the Council of Scientific & Industrial Research for Shanti Swarup Bhatnagar Prizes in science including engineering and technology for 1983. The prizes are to be given for research contributions made primarily in India during the past five years. The upper age limit of nominees for the prize is 45 years.

Five or more prizes, each of the value of Rs 20,000, may be awarded annually for notable and outstanding research, applied or fundamental, in the following disciplines: (1) physical sciences; (2) chemical sciences; (3) biological sciences; (4) engineering sciences; (5) medical sciences; (6) mathematical sciences; and (7) other sciences.

Those who can make nominations include: presidents of approved scientific societies of all-India character; vice chancellors of universities; deans of science, engineering & technology, and medical faculties; directors of Indian Institutes of Technology; deans of faculties and heads of institutions deemed to be of university status; director generals of major R&D organizations such as Defence Research & Development Organisation, Indian Council of Agricultural Research, Indian Council of Medical Research, chairman of Atomic Energy Commission, Space Commission, University Grants Commission, Oil & Natural Gas Commission, etc.; directors of CSIR laboratories, Bhabha Atomic Research Centre, Tata Institute of Fundamental Research, etc.; and Bhatnagar Prizewinners. University faculties should recommend persons working in their institutions only and route the nominations through their respective vice chancellors while, the faculties in IITs should send their nominations through their directors. Directors of CSIR laboratories can nominate a candidate in the discipline of their interest, irrespective of whether they are working in CSIR laboratories or outside. Each Bhatnagar Prizewinner can send the nomination of one person for each year's award in his own discipline only. Each such nomination shall give a detailed statement of work and attainments of the nominee, and a critical assessment report (not more than 500 words) bringing out the importance of the significant research and development contributions of the nominee made during the past five years. Nominations from individuals sponsoring their own names or of others will not be accepted.

Nominations may be sent by registered (acknowledgement due) post along with 15 copies of detailed statements of work and attainments of each nominee and the discipline under which the nominee is to be considered. The attainments of the nominee during the past five years may be highlighted, and sent along with at least one set of reprints of papers published during the 5-year period. Nominations signed by the sponsors should be sent, marked 'confidential', to the Head, Extramural Research, CSIR, Rafi Marg, New Delhi 110001 and should reach CSIR by 31 March 1983.

Regulations governing the prize and the proforma for nomination may be obtained from the Head, Extramural Research, CSIR, Rafi Marg, New Delhi 110001. □

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Battery-active manganese dioxide by chemical methods

Active manganese dioxide, both natural and synthetic, is widely used as cathode material in Leclanche' type dry cell and alkaline Zn-MnO_2 cells. Despite the discovery of various primary cell systems during the last two decades the popularity of and the demand for Leclanche' type dry cells have increased unabated. Although India is one of the important manganese ore producing countries, its contribution to the production of battery-grade ore is insignificant. On the other hand, India is one of the major dry cell manufacturing countries, with an annual turnover of about 800 million cells. As a result, considerable amounts of natural (active) ore and synthetic MnO_2 are imported every year. Therefore, there is an urgent need to step up the production of synthetic MnO_2.

Active MnO_2 can be prepared either by an electrolytic or by a chemical method. Although two plants are producing electrolytic manganese dioxide (EMD) in the country, the demand of synthetic MnO_2 is much more than the production. Essentially, there is no difference between chemical manganese dioxide (CMD) and EMD as far as depolarization or battery activity is concerned. However, the production of EMD is a highly power-intensive process, about 6,000-7,000 units (kWh) of power being required per tonne of EMD. Because of this factor and other process limitations on EMD, renewed efforts are being made throughout the world to develop newer processes for synthesizing active MnO_2. With this background, Regional Research Laboratory (RRL), Bhubaneswar, has worked extensively on the development of various processes for chemical MnO_2.

In all the processes developed, the source of manganese is the low- and off-grade fragile manganese ores which generally do not find any metallurgical uses. The ore is ground and is selectively sulphatized by roasting with ferrous sulphate or ammonium sulphate. On leaching with water, manganese sulphate is obtained in solution, whereas iron remains as the insoluble residue. From manganese sulphate, active MnO_2 has been prepared through the intermediate formation of either $MnCO_3$ or $Mn(OH)_2$, or a combination of both. These intermediate compounds are calcined to a suitable temperature and then leached in dilute acid solution to obtain active MnO_2. In an alternate method, manganese carbonate is dissolved in an acid and the resulting divalent manganese is oxidized to obtain active MnO_2 of high packing density. In general, the products have the following specifications:

Total MnO_2	91-94%
Total H_2O	4-6%
True density	4.2-4.6 g/cc
Packing density	1.3-1.7 g/cc
Phase	gamma

Measurement of the activity under continuous discharge tests has shown that the RRL-Bhubaneswar products are at times even better than some international-standard samples. The cost of production is comparable to that of the electrolytic method.

The laboratory has completed the laboratory-scale work on all the processes and large-scale work is now contemplated. The laboratory is in a position to transfer the technology either through sponsorship or collaborative work. □

NCL's technology based methylchlorosilanes plant goes on stream

Based on the technology for methylchlorosilanes which National Chemical Laboratory (NCL), Pune, has developed in collaboration with Hico Products Ltd, Bombay, the firm has started production in its 1000 tonnes per annum plant at Kharsundi, Maharashtra. The trial production was formally inaugurated by the NCL Director Dr L.K. Doraiswamy. Eleventh in the world and the first of its kind in India, the plant has been erected at a cost of Rs 60 million.

Silicones are organosilicon polymeric compounds, for which methylchlorosilanes form the basic materials, and are of industrial importance owing to their multifarious applications. Possessing a unique combination of metallic and non-metallic properties, silicones find applications as softening and repelling agents in the finishing of textile and leather goods; protective coatings for insulators and in high- and low-temperature lubricants; mould-release agents in the manufacture of rubber

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goods; anti-flatulent additives in pharmaceutical preparations; and several others.

The process for the manufacture of methylchlorosilanes is engineering-intensive, involves complexities common to gas-solid reactions, and poses typical scale-up problems for commercial implementation. The finished products have to be necessarily highly pure and have to satisfy stringent specifications. At NCL, the process was worked out up to a pilot-plant scale of 3-5 kg/hr, the process conditions were standardized, and the maximum conceivable design aspects at that stage of work studied. However, in view of the engineering complexities it was felt desirable to perfect the process on a substantially larger scale in collaboration with an industry before it was commercialized. Hence the NCL's association with Hico Products, who were already producing silicones with imported chlorosilanes but were keen to change over to indigenous technology.

The basic design of the plant was prepared jointly by NCL and Hico and the detailed engineering was carried out by Humphreys and Glasgow Consultants Pvt. Ltd, Bombay. As a collaborative venture with industry, this project is one of NCL's noteworthy successes.

The NCL-Hico's technology is available for any interested entrepreneur through National Research Development Corporation of India. □

CFRI's formed coke undergoes successful field trials

Formed coke which Central Fuel Research Institute (CFRI), Dhanbad, has developed and produced using non-caking low-phosphorus Chirimiri and Churcha coals was tested with successful results for its suitability to replace conventional coke in the production of pig iron. The formed coke (100 tonnes), produced by CFRI in its 1 tonne/hr plant, was used in trial runs in the low-shaft furnace of Kalinga Iron Works at Barbil in December last.

The substitution of conventional coke by formed coke was gradual—from 25% through 33.3, 50 and finally to 75%. The performance, temperature and other conditions, and efficiency of the furnace were extremely satisfactory. There were no operational troubles, the formed coke pieces withstood mechanical and thermal degradation, and the phosphorus content of the metal could be reduced from 0.22 to 0.14%.

The chief objective of the development of the formed coke technology is to conserve the depleting reserves of coking coal and substitute them with non-conventional forms of coke. □

Seminar on Polymers for Surface Coatings

The newly emerging role of polymers and resins in the formulation of organic coatings used in the fast developing areas like space exploration, nuclear power generation, off-shore and underwater exploration and in combating corrosion was reviewed in a seminar. Held at Regional Research Laboratory (RRL), Hyderabad, on 27-28 November 1982, and organized by the Oil Technologists' Association of India (Southern Zone), the seminar on Polymers for Surface Coatings also viewed the adverse effects on the economy of organic surface coatings arising from the escalating costs of petroleum and petroleum-derived chemicals.

Some 150 delegates from universities, Indian Institutes of Technology, other research centres and industrial establishments attended the seminar, which was spread over five technical sessions.

Dr G. Thyagarajan, Director of RRL-Hyderabad, in his welcome address, brought out the need for the development of newer polymers for formulating coatings as the success or failure of such coatings is dependent largely on the type of polymers or resins used.

Shri Ramesh Grover, Commissioner of Industries of the Government of Andhra Pradesh, covered in his inaugural address the developments in surface coatings from the ancient times to the present space age, and also presented the status of surface coating industries in the state. Calling upon R&D institutions, like RRL-Hyderabad, to assist small-scale industries in this area, the industries commissioner assured all possible help from the state government in developing this industry in the state.

The first technical session, chaired by Dr M. Yaseen of RRL-Hyderabad, dealt with the basic properties of polymers in relation to their use in surface coatings. Prof. S.P. Potnis, of University of Bombay, in his keynote address, dealt with the comparative performances of various polymers used in surface coatings. The research papers presented covered the solubility parameter, rheological properties of polymeric materials, and kinetics of polymer reactions.

The second session, chaired by Dr M.M. Shirsalkar of RRL-Hyderabad, addressed itself to speciality polymers for space, atomic energy and offshore establishments. Dr K.V.C. Rao, of Vikram Sarabhai Space Centre, Trivandrum, presented his keynote address on the applications of protective coatings on launch pads, rockets, and satellites which encounter different types of environment, illustrating his lecture with a film on SLV-3 flight. Research papers presented in the session dealt with the development and characterization of polymers for nuclear power industry, underground oil pipelines, building industry, optical fibres, concrete surfaces, electronics industry, high-temperature resistant insulating varnishes, and marine and offshore establishments.

Energy-saving and non-polluting type of polymers were dealt with in the third session, chaired by Shri B. Kumar of Coromandel Paints & Chemicals Ltd, Visakhapatnam. Two keynote ad-

dresses dealt with high-energy radiation curing of organic coatings and printing inks (by Dr N. Krishnamurti of RRL-Hyderabad) and non-polluting types of coatings (by Dr B.G.K. Murthy, also of RRL-Hyderabad). Research papers dealt with anodic and cathodic electrodeposition coatings, vinyl based coatings, etc.

In the fourth session, devoted to polymers for corrosion prevention and recent advances and chaired by Dr K.M. Kamath of BHEL Corporate Research & Development, Hyderabad, Dr J.P. Misra of RRL-Hyderabad presented his keynote address. In this, the speaker discussed the possibility of novel methods of obtaining corrosion resistance and antifouling polymers by possible incorporation of suitable radicals into the polymer backbone or incorporation into polymer of genetically engineered bioorganisms. Research papers covered polyurethanes, epoxy acrylates, and polyesters. In the last session, Dr M.A. Sivasamban, President of OTAI (Southern Zone), critically viewed the suggestions made by the chairmen and in the keynote addresses. □

Semi-synthetic perfumery products

In his attempts to understand the odour-structure relationship and to produce new perfumery compounds, Shri V.K. Sethi of Regional Research Laboratory (RRL), Jammu, has obtained 54 new analogues of citronellal. Of these, citronellyl methyl ketone was found to possess a coconut rosaceous odour; citronellyl isopropyl ketone offered a wide range of odours, viz. aldehydic, nutty, rosaceous and green; and citronellyl isobutyl ketone had a mild green, sappy and floral odour. The studies are not only of academic interest but also of commercial interest to the perfumery industry, and the research paper embodying the results won for its authors the first Dhingra Memorial Medal (1979) of the Essential Oils Association of India [*CN*, 31 (1981), 24].

Shri Sethi also studied the chemical transformation of three monoterpenes—citronellol, linalool and geraniol—and two sesquiterpene lactones—parthenin and parthenolide. The reagents used for these reactions were N-bromosuccinimide (NBS) in different polar media and boron trifluoride etherate. Citronellol with NBS-dimethylformamide (DMF) gave 6-oxo-6,7-dihydrocitronellol, an unusual compound from this reaction. Linalool on reaction with NBS-acetone-H_2O (5%) gave two new compounds, besides a known tetrahydrofuran derivative, which were characterized as 2-bromomethyl-1,4,4-trimethyl-3,8-dioxabicyclo[3:2:1]octane and 2-(2-hydroxy-1-bromoethyl)-2-methyl-5-(2-methyl-2-bromoethyl)tetrahydrofuran. Geraniol on a similar reaction yielded a bromohydrin as expected.

Parthenin on reaction with NBS-DMF-H_2O gave four compounds characterized through spectral data as 12,13-dibromohydroxy acid and 3-monobromoparthenin. Parthenin on reaction with BF_3 etherate gave a dehydrated product, also identified with spectral data.

Parthenolide, another lactone isolated from *Michelia champaca*, was subjected to the action of BF_3-etherate when it gave four rearranged products characterized as micheleolide and its dehydrated products.

From *M. champaca* four sesquiterpene lactones were identified as costunolide, parthenolide, dihydroparthenolide, and micheleolide. From *Inula obtusifolia* were identified alantolactone, iso-alantolactone, α-amyrin, β-sitosterol, and β-sitosterol glucoside along with glucose and mannitol.

Some terpenephenols and nitrothymols were synthesized with a view to developing sandalwood and nitro musk type compounds.

Shri Sethi was awarded Ph.D. degree in chemistry by Jammu University for his thesis based of the studies. Dr K.L. Dhar of RRL-Jammu supervised the work. □

PROGRESS REPORTS

CRRI Annual Report: 1981-82

The Central Road Research Institute (CRRI), New Delhi, according to its annual report for 1981-82 published recently, continued to pursue its R&D activities in eight major subdisciplines: geotechnical engineering, soil stabilization and rural roads, flexible pavements, rigid pavements, general projects, bridges, instrumentation, and traffic. The institute made concerted efforts to economize on the use of the most commonly employed binders bitumen and cement. Betterment of rural transportation, and urban transport planning and transportation economics, were the other two areas on which the institute laid greater emphasis. Other projects pursued by the institute pertained to: mechanism of rock-slope failure: a simple mechanical test for classification and determination of compaction characteristics of soils; effect of grade of bitumen and aggregate gradation on performance of bituminous surfacing mixes; criteria for choice of type of bitumen for flexible pavements; fibre-reinforced concrete pavements; revibrated cement concrete; comparative evaluation of surface textures obtained by different methods of finishing concrete pavement; metallic bearings for bridges; evaluation of the prescribed specific weights of concrete; development of non-destructive nuclear method for measuring *in-situ* density of construction materials; and analysis of road accident data of some big cities of the country.

To improve rural road transportation the institute paid attention to evolving rural road technologies and improving bullock-cart designs. A number of improved bullock-cart designs, for example, have been developed which are available to manufacturing units on nominal payment.

CRRI rendered technical assistance in the construction of the velodrome at

Indraprastha Estate for the IX Asian Games. The institute's expertise was sought in the decentring operation of the roof of the indoor stadium at the Indraprastha Estate, designing of under-layers of the astro-turf at National Stadium, and formulation of specifications for some of the roads and parking sites.

Under a collaborative project of the World Bank and the Government of India on road-user cost study in India the institute compiled a 7-volume final report. The studies have resulted in the development of models for fuel consumption, accident analysis, etc. through computer analysis. The various vehicle operating cost components have been found to be significantly related to roadway factors such as width, curvature and roughness.

The project on road network planning for Bombay metropolitan region, taken up in 1978 at the request of the Maharashtra Government, was nearing completion. A large amount of data from household survey, work-place survey, car-travel survey, etc. were collected and analyzed. Models for trip distribution by rail versus bus models, etc. have been evolved. Projections for AD 2000 have been drawn up and the final road network was being prepared.

Investigations on the stability of hill slopes were undertaken at Pandoh-Aut Road in Kulu Valley and in the vicinity of the Iron Ore Project of the Bokaro Steel Plant at Meghahatuburu. In the former case the stereo-plots of the geological data collected showed toppling type of failure, whereas in the latter case was revealed a wedge type failure at micro- and macro-levels. A modified slope was proposed and suitable measures for surface and subsurface drainage and observational procedure to monitor the mine slopes were recommended for Meghahutuburu. At the request of Himachal Pradesh Public Works Department field studies on the failures of slopes in Chamba town were undertaken and immediate remedial measures were recommended.

The institute has found that zinc diethyldithiocarbamate prolongs the bitumen life by reducing the oxidative hardening of the binder. Field and laboratory studies also showed that tar/bitumen mixes are less susceptible to oxidation than tar or bitumen alone. The miscibility of the two is however controlled by adjusting the asphaltene content in bitumen and the insoluble content in tars/pitches.

Other studies concerning bituminous mixes related to: design of semi-dense asphaltic concrete mixes, use of sulphur in bituminous mixes, and use of resins in bitumens and bituminous mixes. A rubberized bitumen mastic composition comprising rubber, bitumen and aggregates was tried for crack repairing at an airfield location.

An investigation on the utility of indigenously available superplasticizers in cement concrete and mortar showed that these could not only improve the workability of mortars and concretes but also bring about economy in the use of cement. These plasticizers can also be used to improve the strength of cement.

Periodic evaluation of specially designed and constructed experimental stretches of rural roads with different specifications is a project of considerable importance. A 0.8-km long section laid in 1980-81 on the approach road to Nandawala village near Palwal was condition-surveyed. Load tests and Benklemen beam tests were conducted on different specifications in addition to the determination of unevenness index. An examination of rigid and semi-rigid specifications showed that this section of the road was better in performance than the conventional ones. Other stretches whose performance was studied are in Andhra Pradesh, Karnataka, Kashmir, and Rajasthán.

Eighty-four sites in Orissa state were studied for identifying laterites and moorum through aerial photographs.

Tests carried out on the steel fibre-reinforced concrete (FRC) slabs showed that their ultimate load carrying capacity was much more than that of the plain cement concrete slabs. The former could take about twice the deflection of the latter before cracking. With higher flexural strength of FRC and other beneficial properties it is possible to reduce the thickness of the pavement significantly and also improve its long-term serviceability.

A mechanical slope indicator has been developed to measure lateral movements of subsoil layers. It is a handy device for measuring lateral movements at shallow depths (5-6 m).

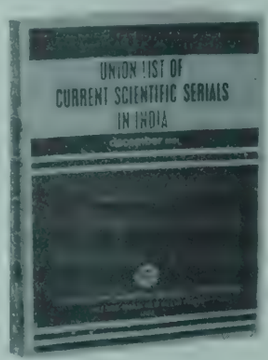
As an improvement over the Casagrades' pore-water pressure cell, a strain gauge pore-water pressure cell, also known as piezometer, has been developed. With a sensitivity of 0.0005 kg/cm^2 the device indicates change of pressure without any time lag.

For measuring swell pressure in expansive soils, a modified triaxial cell has been developed. It can be used for determining vertical swell pressure with different lateral confining pressures and accompanied volume changes. The absolute values of lateral swell pressure corresponding to zero volume change of soil specimens moulded at different moisture contents and densities can also be determined.

Nineteen papers were published during the year. □

Union List of Current Scientific Serials in India: 1981

The Indian National Scientific Documentation Centre (INSDOC), New Delhi, has brought out a 'Union



List of Current Scientific Serials: December 1981'—a volume preparatory to publishing the 'National Union

Catalogue of Scientific Serials'. A supplement to the previous 17 volumes in the Union Catalogue Series published by INSDOC during 1965-1978, the current volume updates the information on new and current scientific serials being received in the libraries of 785 institutions. These include major universities; laboratories under Council of Scientific & Industrial Research, Defence Research & Development Organisation, Indian Council of Agricultural Research, Indian Council of Medical Research, Department of Atomic Energy, and Electronics Commission and Space Commission; R&D units in industrial complexes; Indian Institutes of Technology; and other higher-level institutions and professional bodies in various scientific disciplines.

The Union List records information on 11,511 foreign scientific serials received from 82 countries, and 1892 Indian serials. About 2000 cross reference entries are provided. Also included is a Directory of Participating Institutions, providing particulars such as names, postal and telegraphic addresses, and lending and reprographic facilities. Institutions which can provide photocopies, on payment, of documents held in their stock are listed separately under Document Supply Centres.

Copies [demy 4to; 442 pages; Rs 60 in India, $20 abroad] available from Scientist in charge, Indian National Scientific Documentation Centre, Hillside Road, New Delhi 110012. □

CONFERENCE BRIEFS

FAO-IAEA Planning Meeting

On the invitation of the Joint Division of the FAO-International Atomic Energy Agency, Dr K.G. Das of Regional Research Laboratory (RRL), Hyderabad, attended the planning meeting on 'Controlled release pesticide formulations for pest control' held at IAEA Headquarters, Vienna, 15-19 November 1982. The meeting was convened to make recommendations on the type of controlled release formulations to be developed for the aquatic environment and to use radioisotope techniques to evaluate the release rate, stability of the active ingredient, and metabolism and distribution of the active agent in the environment. Dr Das's report:

The meeting identified three areas for the development of controlled release pesticide formulations: (i) pests for paddy-rice, (ii) water hyacinth control, and (iii) mosquitoes. It was recommended that priority should be given to studies with controlled release formulations of systemic insecticides in rice to achieve improved control of insect pests, lesser risk to farmers and fish, and better cost-effectiveness. Water hyacinth and mosquito control were given second and third priorities, and work was to be started if resources were available.

Chairing some of the sessions, Dr Das made valuable contributions because of his past experience. The CSIR scientist also reports that the recommendations made by the subcommittees which he chaired were accepted in full.

Dr Das, it may be recalled, has developed controlled release pesticide for water hyacinth and for mosquito control, and is currently working on a controlled release Carbofuran for paddy-rice pests. He is recipient of a certificate of merit from National Research Development Corporation of India for his work [*CN*, 32 (1982), 122]. □

DEPUTATION BRIEFS

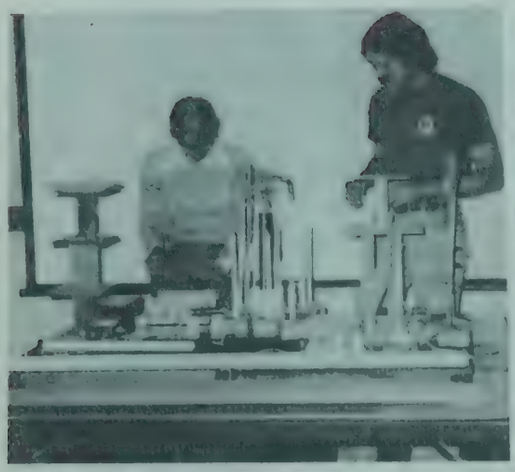
Dr Santosh Kumari of NPL participates in TAET programme

Dr Santosh Kumari of the Division of Materials of National Physical Laboraoty, (NPL), New Delhi, attended the Training in Alternative Energy Technologies (TAET) programme, sixth in the series, held at University of Florida (UF), Gainesville, Florida, USA, from 23 August to 10 December 1982. She is the first CSIR participant to this programme, a cooperative project of the U.S. Agency for International Development and UF, which drew 25 participants from some twenty developing countries. Her report:

The TAET programme provided training in both the technical principles of the alternative energy technologies and the socioeconomic aspects of their selection and implementation. The curriculum consisted of lectures, seminars, laboratory experiments, field trips, technology demonstrations, and special research projects conducted by small groups of participants. A detailed treatment of the technologies applied in converting the principal alternative sources of energy to meet specific needs represented the core of the training programme. These technologies were examined in an analytic sequence starting with the identification of the needs and terminating with the potential means to meet the needs.

Lectures on fundamental technological principles, by eminent professors and scientists, covered heat-transfer and properties of materials, energy conversions, solar thermal principles, fluid flow, power generation and transmission, refrigeration, photovoltaic energy conversion, wind energy, hydropower, and biomass. Basic socioeconomic principles covered through lectures encompassed programme planning, financial, economic and institutional analyses, project management, and project design and integration. The laboratory work consisted of intensive training in the measurement of solar radiation, wind velocity and temperature, and evaluation of the efficiency of various solar energy conversion devices.

In the seminars, Dr Santosh Kumari apprised the participants of her laboratory's work on polycrystalline silicon solar cells, focusing attention on the fact that the NPL process employed low-cost polysilicon substrate for making solar cells, also made in this laboratory, for terrestrial applications. NPL's efforts in cutting down the cost of photovoltaic energy conversion were



The NPL scientist and a TAET faculty member, J. Kurinec, demonstrating light generation from a high-frequency high-potential ac converted from a dc source (on the right is the Tesla coil, the centrepiece of the experimental set-up).

acknowledged by the TAET faculty and participants.

As a special project, the CSIR participant carried out electron-beam-induced current analysis of the grain boundaries in the polysilicon solar cells fabricated at NPL, the analysis revealing the nature of grain boundaries and their influence on the photovoltaic properties of the polysilicon.

In the group project, the NPL scientist worked on the conversion of dc into high-frequency high-potential ac. The project was designed to demonstrate Nikola Tesla's finding that a light bulb properly designed to use high-frequency, high-voltage ac could be much more efficient than a normal incandescent bulb or a fluorescent tube. This consisted of the designing of an inverter and construction of a Tesla coil. The high-frequency high-potential ac was later utilized to generate light. □

School on Computer Applications in Chemical Engineering

The Regional Research Laboratory (RRL), Hyderabad, organized a school on Computer Applications in Chemical Engineering from 22 November to 3 December 1982. The school drew some 55 participants, all chemical engineers and 31 of them from industry. Both instruction and workshop practice were provided in: computer-aided modelling, simulation, optimization and control of chemical processes, and evaluation and prediction of physical and thermodynamic properties. Preliminary lectures on computer hardware and software were also included. The school provided a good forum for discussion of the problems faced by the participants.

Most of the faculty for the school was drawn from this laboratory under the direction of Dr Asghar Husain. Two guest speakers, Prof. Anil Kumar of IIT-Kanpur and Prof. A.P. Kudchadkar of IIT-Bombay, delivered lectures in their areas of specialism. □

EXTRAMURAL RESEARCH

Genetic analysis of yield traits and leaf rust resistance in wheat

The genetic vulnerability of crops to diseases and pests poses a serious problem. Commercial varieties of crops have to be replaced after every 4 or 5 years by newer ones, which are more resistant/tolerant to the pathogens. In wheat, the rusts are the most damaging fungal pathogens. Losses in production owing to rusts amount to 10-15% every year, and in epidemic years such losses are much more. In India, leaf rust or brown rust is prevalent throughout the wheat-growing areas. In the eastern part of the country—eastern Uttar Pradesh, Bihar, West Bengal, and Assam—leaf rust is the major wheat pathogen.

Researches carried out by a CSIR research fellow have provided some solutions in the form of selection of the best gene combinations for leaf rust resistance as also the best combiners for yield traits and yield. The researcher, Shri Vinod Tewari, worked in the Department of Genetics and Plant Breeding of Banaras Hindu University (BHU), Varanasi (Jan. 1979 to July 1982).

Twenty-one wheat lines introduced in India from CIMMYT (Mexico), Peru, Argentina, and ICARDA (Syria) were crossed with five local varieties susceptible to leaf rust. Adult plant leaf rust resistance was studied under artificial epiphytotic conditions in field at Varanasi and Wellington (Nilgiris). Five lines—CPAN 1874, CPAN 1666, CPAN 1810, CPAN 1829, and CPAN 1830—were highly resistant. The first one showed the highest degree of resistance in the cross with Agra Local, the universally susceptible variety. Seedling leaf rust resistance was studied in glasshouses of the rust laboratory in Simla. The material (parents, F_1s, F_2s, and back-crosses) was screened against seven leaf rust races which are widely prevalent and highly virulent. The CPAN 1874 seedling was also resistant to all races used in the screening. Gene combinations of *Lr* (leaf rust resistance) genes, namely (i) *Lr* 10 + *Lr* 20, (ii) *Lr* 10 + *Lr* 15 + *Lr* 20, and (iii) *Lr* 3 + *Lr* 10 + *Lr* 20 have been suggested for combating the virulent races.

Most of the lines screened possessed the adult plant resistance gene *Lr* 13, and CPAN 1874 had *Lr* 26, an alien gene from *Secale cereale*. Besides having resistance to leaf rust, these lines were

also found to be good combiners for yield. The lines CPAN 1532, CPAN 1666, CPAN 1757, CPAN 1810, CPAN 1829, CPAN 1830, and CPAN 1874 could be exploited by wheat breeders, suggests the CSIR fellow.

Shri Tewari, who worked under the guidance of Dr B.D. Singh of the same department, was awarded Ph.D. degree by BHU for his thesis based on the study.

* * *

Chemistry of molybdenum

The biological importance of molybdenum and the increasing industrial use of the element have stimulated, in recent years, research in the chemistry and properties of molybdenum and its compounds. A CSIR research fellow, Shri K.S. Nagaraja, has studied the coordination compounds of molybdenum. The studies were made at the Department of Chemistry of Indian Institute of Technology, Madras, during 1979-82. Since molybdoenzymes are found to contain a wealth of sulphur, sulphur-rich molybdenum compounds were prepared. The interaction of hard base chelates like 8-hydroxyquinoline, salicylaldehyde and N-nitrosophenylhydroxylamine with ammonium tetrathiomolybdate give rise to disulphidomolybdenum(VI) complexes. The interaction of ammonium tetrathiomolybdate with soft base ligands like dithiocarbamates, dithiophosphates and xanthates give rise to sulphidomolybdenum(V) complexes, and with ethylthioxanthate, a molybdenum(IV) complex is obtained. It has been observed that the reducing power of sulphur chelates is in the order dtc ~ dtp < xan < txan. The results may provide an insight into the role of sulphide coordination to molybdenum in molybdoenzymes.

Some of the mononuclear oxoisothiocyanatomolybdenum(V) complexes with various dithiocarbamates have been prepared. The analytical, spectral, magnetic and electrochemical studies suggest the composition as $MoO(NCS)(dtc)_2$. From the EPR studies it was concluded that the probable biomimic of xanthine oxidase may be the complex $MoO(NCS)(1\text{-thpdtc})_2$, where 1-thpdtc is 1-tetrahydropyrroledithiocarbamate, and thus molybdenum may have a distorted octahedral geometry with a definite involvement of sulphur coordination.

Since nitric oxide deactivates the molybdoenzymes, studies on nitric oxide complexes of molybdenum may be helpful. Some of the dinitrosylmolybdenum complexes of the type $Mo(NO)_2(dtc)_2$ were prepared and characterized. ^1H NMR and ^{13}C NMR showed multiple resonances for N-alkyl groups of dithiocarbamates, which support that the complexes are of *cis*-configuration. The diamagnetic nature and the electrochemical studies suggest that the formal oxidation state of molybdenum in these complexes is zero.

The stability constants of the various species formed in aqueous solution of the system MoO_4^{2-}-diethylenetriaminepentaacetic acid (H_5L) were evaluated by the potentiometric method. From the solution studies it has been suggested that the prominent species that are involved in biological transport of molybdenum may be a 1 : 1 electrolyte of type $Na[MoO_2(H_2L)]$.

Shri Nagaraja, who carried out the investigations under the supervision of Dr M.R. Udupa, Assistant Professor of Chemistry, IIT, Madras, was awarded Ph.D. degree by the institute.

* * *

Mammalian spermatozoa and steroid-ascorbate relationship

The administration of estrogen as a male contraceptive has been found to produce side effects. In combination with testosterone and ascorbic acid, estrogen is being tried in rodents with a view to developing a contraceptive that would not affect the libido. Such a study using estrogen in different combinations and antigonadotrophic hormones (antiserum against gonadotrophins) as contraceptives could be useful under Indian conditions for human fertility regulation.

Shri M.V. Rao, a CSIR research fellow, who worked at the Department of Zoology, Gujarat University, Ahmedabad, investigated the effects of estradiol benzoate (E_2B) on reproductive functions and fertility of male albino rats. His studies revealed that the dose and duration of E_2B treatment were directly related to sperm reserves in cauda epididymis and testis and alterations in redox milieu of the androgen target organs. The resulting deprivation of androgen induced antifertility. The reduction in sperm motility and increases in abnormal spermatozoa of E_2B-treated rats were correlated with their reduced fertilizability.

The administration of E_2B along with testosterone supplementation for seven days also manifested antifertility effects without affecting the androgenic functions of androgen target organs. However, the accessory gland functions were found to be affected. The manipulation of estrogen doses along with androgen combination, therefore, appears to be a better treatment rather than administering either estrogen or testosterone alone.

The biochemical, histochemical localization of hydroxysteroid dehydrogeneases (HSDs), hormonal and *in vitro* studies showed that estrogen had a direct effect on testicular and probably adrenal metabolism affecting the steroidogenesis by inhibiting testosterone production. The treatment with human chorionic gonadotrophin antiserum also showed antiandrogenic antifertility effects as a consequence of androgen deprivation to target organs, i.e. testis, epididymis, vas deferens and seminal vesicle, in rats for five days.

Vasectomy did not manifest any adverse effects on the biochemical profile of human seminal plasma, serum testosterone levels, accessory gland function, and Mn^{2+}-free radical utilization. However, copper and mang-

anese levels in seminal plasma were found to be lowered.

A comparative scanning electron microscopic study of the surface morphology of rat and human spermatozoa showed that the rodent spermatozoa differed from that of human beings with respect to shape. Similarly, the sperm morphology of oligospermia was also significantly different from that of normospermia.

Shri Rao, who carried out his work under the guidance of Dr (Kum.) N.J. Chinoy of Gujarat University, was awarded Ph.D. degree (1981) for his thesis. Dr Rao was a CSIR postdoctoral fellow till October 1982.

* * *

Microdetermination of metals by spectrophotometry and gas-chromatography

Under a new CSIR scheme granted to him, Dr A.P. Joshi of the Department of Chemistry, Nagpur University, Nagpur, proposes to carry out analytical studies on the microdetermination of Mn, Cr, Fe, Cu, Zn, Pb, Hg, Cd and As in foodstuffs, waters, minerals and ores, employing spectrophotometric and gas-chromatographic methods. For spectrophotometric studies, Dr Joshi proposes to prepare novel nitrogen-, sulphur- and fluorine-containing organic compounds that could form stable complexes with the metal ions. Effects of *p*H, solvent and diverse ions will also be studied. The gas-chromatographic studies would relate to the choice of solvent, column, temperature, detector system, etc. □

PATENTS FILED

489/Del/82: A composite multisection quick-release centring prop for use in in-situ concrete constructions, Z. George, H.G.I. Sreenath, A. Chellappan & N. Sethuraman—Structural Engineering Research Centre, Madras.

439/Del/82: Process for the synthesis of 3-(N-ethylacetamido)-1-methylpiperazin-2-ones, S.K. Dubey, S. Sharma and Nitya Anand—Central Drug Research Institute, Lucknow.

PERSONNEL NEWS

Appointments/Promotions

At Central Leather Research Institute, Madras, Dr N. Chandrakumar has been appointed Scientist C (22 July 1982).

* * *

At Publications and Information Directorate, New Delhi, Shri R.P. Gulati has been appointed, on promotion, Senior Sales & Distribution Officer (3 Jan. 1983). □

Dr B.L. Amla

Dr B.L. Amla, Director, Central Food Technological Research Institute, Mysore, has been appointed chairman of the coordination council for the biological sciences group of CSIR laboratories for a period of two years with effect from 18 January 1983 in place of Dr C.K. Atal, Director, Regional Research Laboratory, Jammu. □

NEERI Cochin zonal laboratory shifted

The Cochin zonal laboratory of National Environmental Engineering Research Institute (NEERI) has shifted from Edappally to Palarivattom. The new address: 'MAITRI', 33/24A, Chakkungal Road, Palarivattom P.O., Cochin 682025 [Telephone No. 39788; Telegraphic code: NEERI Ernakulum]. □

COUNCIL OF SCIENTIFIC & INDUSTRIAL RESEARCH

Advertisement No. 53/82

The Council proposes to appoint at Regional Research Laboratory, Hyderabad, a Scientist F for planning and coordinating major projects involving institutions within and outside CSIR. Scale of pay: either Rs 2000-125/2-2500 or Rs 2250-125/2-2500-EB-125/2-2750. Further details about the post and prescribed pro forma for sending curriculum vitae obtainable from Joint Secretary (Administration), CSIR, Rafi Marg, New Delhi 110001. Deadline of receipt of applications at the above address: 25 *February* 1983.

Advertisement No. 1/83

The Council proposes to appoint a Scientist F at Central Salt & Marine Chemicals Research Institute, Bhavnagar. The post is in the area of marine algae. Scale of pay: either Rs 2000-125/2-2500 or Rs 2250-125/2-2500-EB-125/2-2750. Further details about the post and prescribed pro forma for sending curriculum vitae obtainable from Joint Secretary (Administration), CSIR, Rafi Marg, New Delhi 110001. Deadline for receipt of applications at the above address: 29 *March* 1983. Those who had responded to CSIR Advt. No. 6/81 need not apply again.

Advertisement No. 2/83

It is proposed to appoint Director for Central Road Research Institute, New Delhi. The institute is devoted to research and development on all major aspects of highway engineering including road traffic engineering and safety.

The main activities of the institute at present are: undertaking basic and applied research in consonance with the national priorities in the transport sector for investigation, design, construction and maintenance of different types of roads and runways; development of appropriate tools, machinery, equipment and instruments related to highway engineering; rendering of technical advice and consultancy services to various organizations; training of road engineers and technologists for efficient implementation of road development plans of the country; and communication of information on topics relevant to highway engineering and road development plans of the country.

Qualifications/Experiences: The prospective Director should have high academic and research attainments in the field of engineering, preferably highway engineering with proven excellence of leadership and management of R&D related to roads and should show evidence of managerial and administrative experience. He should be able to enthuse younger colleagues and establish close rapport with government and private agencies and is expected to provide a high-level leadership in the formulation and implementation of R&D programmes in the area of surface transport.

Scale of pay: Rs 2500-125/2-3000. He will draw, in addition, other allowances as admissible to Central Government employees stationed at New Delhi. Higher initial pay can be given. The person selected will be appointed on contract for a period of six years. The contract is renewable and the incumbent can be confirmed. Other conditions of contract will be supplied on request. Consultancy earning up to Rs 15,000 per annum is permissible. The incumbent will be provided residential accommodation in the Director's bungalow (as and when constructed).

Age: Below 50 years, relaxable in deserving cases.

Those interested are requested to send their curriculum vitae in duplicate in the standard pro forma obtainable from the Joint Secretary (Administration), Council of Scientific & Industrial Research, Rafi Marg, New Delhi 110001. They can also obtain a brochure on the aims and objects and the latest annual report of the institute. Completed copies should reach the above address on or before 4 April 1983. □

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CLRI scientists among NRDC's Republic Day Awards

A team of five scientists from Central Leather Research Institute (CLRI), Madras, are among the recipients of this year's Republic Day Awards of National Research Development Corporation of India (NRDC). The scientists—Shri M. Chockalingam, Shri K. Radhakrishnan, Shri T.K. Parthasarathi, Shri S. Natesan, and Prof. M. Santappa (former Director)—have been jointly awarded a sum of Rs 15,000 for developing a technique of producing special surface effects on finished leathers. This is achieved by the application of a special formulation prepared with readily available chemicals. By this technique even inferior varieties of leather could be converted into high value-added products.

The 1983 awards, totalling Rs one lakh, have been given to 18 inventors who between them have to their credit seven inventions. The NRDC has also announced grant of financial aid totalling Rs 24,500 for development of three inventions. □

CSIR among 1982 FICCI awards

One CSIR laboratory and two CSIR scientists have been chosen by the Federation of Indian Chambers of Commerce and Industry (FICCI) for its 1982 awards.

FICCI gives annual awards for outstanding contributions by companies and institutions as well as by individuals in various fields of socioeconomic development (such as family planning, rural development and rehabilitation of the disabled) including research in science and technology.

The institutional award goes to Regional Research Laboratory (RRL), Jorhat (which shares the award with National Institute of Nutrition, Hyderabad). The two CSIR scientists who figure in the list of individual awardees are Dr A.P. Mitra, Director of National Physical Laboratory (NPL), New Delhi (Dr Mitra shares the award in physical sciences including mathematics with Prof. K.L. Chopra of IIT-New Delhi); and Prof. P.K. Jena, Director of RRL, Bhubaneswar (Prof. Jena shares the award for technology with particular reference to its interaction with industry with Prof. R.K. Katti of IIT-Bombay).

The Regional Research Laboratory, Jorhat, will be awarded for the development of technologies for the manufacture of low-cost roofing sheets from paper, cellulosic and other wastes, flow improver for transportation of crude and broad-spectrum pesticides of the organophosphorus group.

Dr A.P. Mitra gets the award for his research in the field of ionosphere and aeronomy, stratospheric and tropospheric chemistry, terrestrial ionosphere and solar flares, photochemistry,

atmospheric evolution, and the effects of minor constituents on global climate.

Prof. P.K. Jena receives the award for his applied research in minerals, metals

and special materials and the transfer of technologies to industry, resulting in considerable savings. Processes developed for recovery of cobalt, nickel and copper, and high-grade electrolytic iron powder deserve special mention. □

Seminar on Frontier Technologies in the Third World: Towards a Strategy for Self-reliance

Just as a collection of facts is no more a science than a heap of stones a house, so does a mere collection of machines, tools and techniques not constitute technology. Technology is the total stock of knowledge applied in the use of any mode of living. This was the message of a CSIR seminar which highlighted the developments in and the use of such advanced technologies as nuclear power, microelectronics, information technology, biotechnology, space technology, and ocean technology. The seminar, devoted to 'Frontier

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Technologies in the Third World: Towards a Strategy for Self-reliance' with special reference to the Indian scenario, organized by National Institute of Science, Technology and Development Studies, was held in New Delhi from 15 to 18 December 1982. Starting with the very nature of technology itself, and its characteristics, the seminar threw open for discussion a smorgasbord of topics like, for instance, issues involved in the use of new technologies in developed as well as developing countries; relevance of frontier technologies in the Third World; the experience of building capabilities in such technologies; international regimes and regulations in their acquisition; and strategies for attaining self-reliance.

The upshot of the seminar, which was perhaps the first attempt to assess all the frontier technologies in their totality at one time and at one place, was that it provided possible guidelines for national science and technology policies in such areas.

A number of senior scientists from the various laboratories of CSIR, Bhabha Atomic Research Centre, Indian Space Research Organisation, Electronics Commission, Department of Science and Technology, Department of Ocean Development, and Defence Research & Development Organisation were among the participants. Also taking part in the seminar were technologists and social scientists from universities, and lawyers specializing in international law from the Ministry of External Affairs. Forty-four papers were presented and discussed in seven sessions, as a result of which some guidelines were formulated.

Inaugurating the seminar, Prof. M.G.K. Menon, member of Planning Commission, urged the Third World scientists to convince decision makers of the need for capabilities in frontier technologies. He spoke at length on how the utilization of frontier technologies had contributed to the welfare of mankind. Warning the Third World countries against any complacency, he said there was no indication whatsoever of any slowing down in discovery of new knowledge. "Unless these countries make special efforts to develop indigenous capabilities in the area of frontier technologies the have-nots will remain where they are." He also added that India with a major capability in science and technology in terms of quality and skills should provide leadership to the Third World in developing its technological capabilities.

The first session, on Nuclear Technology, examined the origins of nuclear technology and industry, the rising social concerns against nuclear energy in the 1970s, and the current crisis in the world nuclear industry. It also took note of the discriminatory nature of the international regime on nuclear energy which restricts the diffusion of nuclear technology to the Third World. It was widely felt that nuclear energy could play an important role in the future energy needs of the Third World. The role played by the Department of Atomic Energy (DAE) in India in building nuclear technology in a self-reliant manner was noted. However, the implementation of the nuclear power programme in the country came under critical questioning. DAE's attempts to do everything relating to nuclear energy within the department itself, the seminar felt, had made the organization unwieldy and ineffective. The failure on the heavy water front had been critical in our inability to achieve self-reliance in nuclear energy. The need for an independent regulatory body to look into issues like safety and other concerns was stressed. It was also felt that there had been little or no Indian effort in developing the thorium fuel cycle. Hence a suggestion that the original three-stage strategy of the Indian nuclear programme needs to be reviewed, given the delay and difficulties confronting the fast-breeder programme. India should pursue the idea of using CANDUs as thorium convertors, the seminar discussions revealed.

The second session, on Microelectronics, took note of the rapid developments, particularly in large-scale integration, software and power electronics, and examined the implications which these developments have for exports, balance of payments, sovereignty and security of the developing countries. It was emphasized that the opportunities and threats posed by microelectronics are so significant that the country could ignore these developments only at her own peril.

FRONTIER TECHNOLOGIES IN THE THIRD WORLD
TOWARDS A STRATEGY OF SELF-RELIANCE
NATIONAL INSTITUTE OF SCIENCE, TECHNOLOGY & DEVELOPMENT STUDIES

Prof. M.G.K. Menon, member of Planning Commission, delivering his inaugural speech at the seminar. Seated on the dais are Shri D.K. Abrol, Scientist, NISTADS and Prof. A. Rahman, Director of NISTADS

Information Service

The seminar underscored the need for developing local capabilities both in chip manufacture and applications. The existing scientific and technological base in India was found to be altogether inadequate for achieving self-reliance in microelectronics. The shortage of trained microchip designers was identified as the key bottleneck in starting indigenous manufacture.

The need to stimulate internal market emerged as an important step required for starting the local manufacture of microchips. The Government could play a major role in the promotion of internal market through its procurement policy, the seminar felt.

Because of the small size of the internal market and the high initial costs of building the chip manufacture capability, many experts advocate export-led strategy for establishment of semiconductor industry in India. It was noted that it would become increasingly difficult to obtain technical know-how for critical stages of IC design and mask-making given the tendency for increasing technological protectionism in the semiconductor industry. A note of caution was echoed against the export-led strategy since this involved an invitation to multinationals, which in turn could lead to increasing technological dependence.

Important applications of microelectronics in India were seen in agriculture, education, traffic management, etc.

The third session, devoted to Information Technology, covered a wide range of issues relating to social concerns as, for instance, employment, impact on working conditions and de-skilling; dependence on data bases controlled by developed countries, particularly for scientific and technical information; over-consumption of computers; and inappropriate applications. A note of caution was sounded against the import of information technology equipment. Tailored as it was to the needs of the affluence-induced service sector in the developed market economies, the technology could lead to large labour displacement in LDCs.

The fourth session, on Space Technology, devoted its attention mainly to two areas: satellite communications, and remote-sensing. Taking into note the importance of satellite communications, the participants agreed that satellite communications need not be capital-intensive over the long term if a programme of time-phased launching of satellites is undertaken. The importance of developing system-level understanding for achieving self-reliance in satellite communications was highlighted by space scientists. Viewing the discriminatory rules at the international level regarding the allocation of geostationary slots and radio frequencies for communications satellites, the conferees expressed concern at the fact that the Third World demand for orbit planning was yet to be accepted by developed countries.

A wide range of national and international issues relating to remote-sensing also came up for discussion. Attention was also drawn to the dangers of the misuse of information available by remote-sensing. The case of collection of data on crop resources was cited as an example of the possible misuse of information. While data on crop resources were useful to farmers the same data could be used by traders and speculators for price manipulations.

Turning to the international aspect, the seminar took note of the dangers of importing equipment, the lack of assurance of continued services beyond 1990 with foreign satellites, and the legal problems relating to the sensing of one country by another.

The fifth session, on Ocean Technology, while taking note of the rapid developments in the area, examined the implications of the recent agreement on the law of the sea. The participants agreed that the agreement had provided an important economic opportunity to the developing countries by way of access to large resources beyond the territorial limits. However, it was felt that in order to arrive at a consensus, the developing countries had given a large number of concessions to the developed countries.

The participants stressed the need for an integrated and a well-coordinated approach to the development of ocean engineering research.

In view of the large investments needed for mining polymetallic nodules from the sea-bed, an opinion was expressed that developing countries should pool their resources by forming a consortium to exploit such resources.

The sixth session, on Biotechnology, took note of the revolutionary developments in the area, and identified priority areas for India as: immunotechnology; genetic engineering; immobilized enzyme technology; plant and animal tissue culture; nitrogen fixation in plants; and fermentation technology. The seminar noted that a vast market already exists for biotechnology products in the country and the need is for their immediate commercial production. Examples of cholera and malaria vaccines, disease-resistant varieties of palm and coconut, etc., were mentioned.

The participants called upon the Government to create a public sector corporation for manufacturing biotechnology products.

Concern was expressed on the formation of advisory bodies with biotechnology experts of Indian origin working abroad. Given the society- and culture-specific nature of biotechnology products, it was felt that the determination of priorities in biotechnology research should be the prerogative of scientists working in India.

Some of the suggestions, cutting across all the frontier technology areas, that emerged in the deliberations of the seminar are:

Organizational structures

The DAE type of organizational structure was necessary and useful in a

period when there was no R&D and industrial infrastructure in the country. Such a model needs to be reconsidered given the broad range of capabilities built up in the country. For the development of frontier technologies, the approach of multi-institutional projects coordinated by a local agency could be a more fruitful one.

Perspective planning

The need for long-term perspective planning was emphasized. Given the substantial investments involved and the long periods required to develop frontier technologies, any attempt at building these would have to be based upon perspective planning. This would call for commitment to substantial investment and stability in policy instruments. Advance planning is extremely important to mobilize domestic industry for participation in the manufacture of critical equipment and instrumentation for the frontier technology programmes.

Subcritical efforts

A major problem in India highlighted was the baneful nature of subcritical efforts in a number of areas. In the past, the nature of investment and development policy had been such that the problem of technology development was tackled only in parts with a number of critical items being left out. For lack of commitment by the Government to any priorities, subcritical efforts continue, leading to uneconomic development of resources. This was attributed to lack of planning and direction in the development of indigenous technology.

Wide-ranging capabilities and linkages

The seminar recognized that each area of frontier technology is an ensemble of a broad range of technologies and involves the contributions from diverse scientific disciplines. These scientific and technological capabilities are naturally distributed over a large number of institutions. In building frontier technologies the seminar suggested (i) strengthening of the existing capabilities, (ii) building of new capabilities where needed, and (iii) forging together of the diverse capabilities through effective linkages.

Integration with overall development strategy

The seminar also stressed the need for integrating the strategies required for frontier technologies with the overall strategy for socioeconomic development. Infrastructural social investments in education, health, telecommunications, etc. should be made to generate a strong internal market so essential for the growth of frontier technologies, particularly space, microelectronics, and biotechnologies. The Government can and should play a leading role in stimulating the internal market.

Appropriate choices

The seminar cautioned against blind duplication of the products and services being created in the Western countries in frontier technologies. Specific and appropriate applications need to be developed by taking into consideration the requirements of the Third World peoples. Technology assessment systems should be reviewed to include aspects like maintenance and operation, employment, energy intensity, capital intensity, environment, and culture. □

Symposium on Advances in Corrosion Control

Deep concern for the enormous losses resulting from corrosion was expressed by Dr T.R. Anantharaman, Director, Institute of Technology, Banaras Hindu University, Varanasi, while inaugurating a symposium on Advances in Corrosion Control. The symposium was organized by and held at Central Electrochemical Research Institute (CECRI), Karaikudi, on 19 November 1982. According to Dr Anantharaman, the magnitude of the corrosion problem was so great that about one-fifth of the 700 million tonnes of steel produced in the country was lost annually because of corrosion. The speaker called upon scientists and technologists to make concerted efforts to minimize the economic losses resulting from corrosion. The symposium discussed the advances made in corrosion science and technology with special reference to newer techniques in corrosion monitoring, development of inhibitors, and corrosion in non-aqueous solvents. Spread over four technical sessions the symposium had the participation of more than 250 delegates.

Three keynote addresses, one each on 'Recent advances in corrosion control' (Dr K.S. Rajagopalan, Director, CECRI), 'Metallic glasses' (Dr T.R. Anantharaman), and 'Corrosion inhibitors based on phosphates' (Shri P.H. Pandya, Managing Director, Chemofarbe Industries, Thana), were delivered. In addition, 15 research papers were presented.

Dr Rajagopalan in his address discussed the progress made in atmospheric corrosion monitoring, hot corrosion, hydrogen embrittlement, reinforcement corrosion, effect of radiation on corrosion of metals, use of computer in corrosion measurements, *in-situ* spectro-electrochemical measurements, passivation, metallic glasses, organic and metallic coatings, cathodic protection, non-metallic material for corrosion prevention, and corrosion inhibitors.

In the first session, devoted to advances in corrosion science and newer techniques in corrosion monitoring, was discussed the use of impedance technique for studying the corrosion of steel. One of the papers dealt with the adaptability of coulostatic technique to high-resistance media by the elimination of IR drop, and comparison of corrosion rate obtained by the dc method. The performance data on the atmospheric corrosion monitor developed by CECRI were discussed in another paper.

The corrosion resistance of electrodeposited nickel-phosphorus and nickel-phosphorus-boron alloys was discussed in the second session devoted to newer developments in alloying. Surface alloying by the hot-dip aluminium technique for better corrosion prevention was also discussed in this session.

The third session, devoted to development of corrosion inhibitors based on phosphonates, had papers on: role of guanidine derivatives like dicyandiamide guanyl urea and biguanide as corrosion inhibitors for pure iron in neutral aqueous solution and their adsorption; chemical nature of the corrosion film formed on mild steel in NaCl solution as revealed by Auger electron spectroscopy; and use of sodium dodecyl sulphate, sodium decyl sulphate and sodium octyl sulphate as inhibitors for pure aluminium and commercial aluminium in 5% NaCl solution. A paper based on the experiments carried out on a cooling tower of a fertilizer plant using phosphonates with polyphosphate and zinc described their effectiveness in the *p*H range 7.6-8.2.

The last session on corrosion in nonaqueous solvents had a paper dealing with the effect of glycerol on corrosion of mild steel.

The symposium was presided over by a former director of CECRI, Prof. K.S.G. Doss, who is at present consultant to sugar, chemical and allied industries in Madras. □

Flow measurement in avionics system of Jaguar

An inertial system for navigation and attack system is being installed by INAS Integration Organisation (IIO) on Jaguar with the help of a French company. An inertial platform with two gyroscopes is a critical unit in the inertial system for navigation and attack. The system performance is dependent on the cooling of the sensitive platform and the measurement of cooling air flow under various conditions was regarded as an essential ingredient of integration. At the request of IIO, scientists of National Aeronautical Laboratory (NAL), Bangalore, participated in experiments on the Jaguar with the first system installed and with several simulated operational conditions corresponding to various flight as well as runway conditions. Static pressure and temperature were measured by suitably interfacing the instrumentation of the NAL boundary layer laboratory which included a precision micromanometer developed and used over the years in the NAL boundary layer laboratory. The flow measurements on Jaguar were a complete success and the IIO have expressed their full satisfaction.

Aeroelastic testing of ASLV

The aeroelastic behaviour of augmented satellite launch vehicle (ASLV) owing to transonic buffeting has been taken up for investigation by National Aeronautical Laboratory (NAL), Bangalore. The project, which costs Rs 3.5 lakh and lasts 19 months, is sponsored by Vikram Sarabhai Space Centre, Trivandrum. This involves (i) design and fabrication of a dynamically sealed aeroelastic model of the launch vehicle and support system that simulates the free-free condition; (ii) testing of the model in the 1.2 m wind tunnel in the transonic speed range; and (iii) evaluation of the data obtained. □

Cooling of industrial buildings

The roof surface evaporative cooling system which Central Building Research Institute (CBRI), Roorkee, had developed earlier for flat roofs has been extended successfully to cooling industrial buildings with galvanized-iron/asbestos-cement sheet roofs as well. The system is based on evaporation of water from a water-retentive material spread over the roof and kept wet by revolving-type water sprinklers operating at low pressures. For automatic operation of the sprinklers a water-actuated switch has also been designed by the institute by using the principle of change in resistance with moisture between a pair of probes mounted on the water-retentive material. The cooling system with the automatic water-actuated control was installed on the roof of the institute workshop building having a pitched-type corrugated galvanized-iron sheet roof of 800 m^2 area. The performances of the cooling system and of the automatic water-actuated control, studied during the summer of 1982, were found quite satisfactory. The system effected reduction of the ceiling temperature by about 27°C and that of the indoor air temperature by about 8°C during the dry period, thus resulting in a considerable improvement of the indoor thermal conditions. The cost of installation of the system was found to be Rs 12 per m^2 and the daily water requirement was of the order of 10 litres/m^2 of the roof area. Daily consumption of electricity in the water-actuated switch comes to 0.1 kWh only. However, in the case of inadequate water pressure, when a pump is required, the daily consumption of electricity may be up to 1 kWh. □

Microflora of prepackaged meat

The microbiological characteristics of meat processed in the existing slaughterhouses have been studied in comparison with those of meat processed in the modern abattoir at Central Food Technological Research Institute (CFTRI), Mysore. The study was made by Shri D. Narasimha Rao of CFTRI.

The meat processed in a local slaughterhouse showed higher microbial load and higher incidence of pathogenic staphylococci and *Salmonella*. The isolated serotypes were *S. adelaide*, *S. gaminara*, *S. newport*, *S. virchow*, and *S. paratyphi* B. The incidence of the entertoxin A producing staphylococci was higher. Application of modern slaughter techniques improved the microbiological quality of

meat. Sanitizers were developed to bring down the microbial and pathogenic microorganism levels in meat. A new technique of employing papain for sampling of meat surface to recover a maximum number of microorganisms was worked out. Rapid methods to detect the microbiological quality of meat, and new methods to extend the shelf life of meat at ambient and chill temperatures, were worked out. The effect of various packaging materials on shelf life of meat during storage at 4°C was studied. Microorganisms associated with the spoilage of prepackaged meat were identified.

The results of the study are of significance to the meat industry in improving the hygienic status of meat and in setting up microbiological standards for fresh and prepackaged meat.

Shri Narasimha Rao was awarded Ph.D. degree by Mysore University for his thesis based on the study. □

Chemical investigations of *Costus* and *Cryptocoryne* species

Diosgenin, a steroidal sapogenin, is a versatile raw material for the synthesis of steroidal hormones. The phytosterols have gained importance because of their microbial transformation into hormones and corticosteroids. Keeping in view the importance of steroids, Shri M.M. Gupta of the Central Institute of Medicinal & Aromatic Plants (CIMAP), Lucknow, has carried out chemical investigations on the *Costus* roots for steroids. A new sterol, characterized as stigmast-9(11)-en-3β-ol, was isolated along with diosgenin and sitosterol. Rarely occurring $\Delta^{9(11)}$ sterols are reported to be very important for the synthesis of corticosteroids. Three new rarely occurring unsymmetrical long-chain hydroxy ketones, 24-hydroxy-triacontan-26-one, 24-hydroxyhentri-acontan-27-one, and 8-hydroxy-triacontan-25-one and two long-chain esters, methyl triacontanoate and methyl tritriacontanoate (new compound), have also been isolated and their structures established by spectroscopic and chemical methods. Only a few methyl esters occur naturally. In addition, five saponins—β-sitosterol-β-D-glucopyranoside, prosapogenin B of dioscin, prosapogenin A of dioscin, dioscin, and gracillin—have also been isolated for the first time from the roots of this plant.

Four new, rarely occurring oxo esters and oxo acids were isolated from the rhizomes of *Cryptocoryne spiralis* and their structure elucidated as ethyl 14-oxotetracosanoate, 15-oxo-eicosanyl 14-oxoheptadecanoate, 22-oxononacosanoic acid, and 26-oxohentriacontanoic acid by spectroscopic and chemical methods. Sitosterol and hentriacontane have also been identified.

The researcher has also estimated diosgenin in more than a thousand samples of *Costus speciosus* rhizomes, collected from all over India, to select high diosgenin containing strains for multiplication in the field. Distribution and variation of diosgenin in different parts of *C. speciosus* at different intervals of growth were also studied to find the optimum time of harvesting of the plant. Rhizomes and seeds were found to be good sources of diosgenin. No other parts of this plant can be commercially exploited as their diosgenin contents are very low. It has been experimentally demonstrated that the rhizomes of *C. speciosus*, on sprouting in sealed polythene bags, produce 20% more diosgenin than the control.

For his thesis based on these studies, made under the guidance of Dr R.N. Lal of CIMAP, Shri Gupta was awarded Ph.D. degree by University of Avadh. □

PROGRESS REPORTS

CSIR Annual Report: 1981-82

The annual report of Council of Scientific & Industrial Research for 1981-82, published recently, highlights the CSIR's R&D activities under the following heads: Resource development (coal and other minerals); Electronics and instrumentation; Chemicals and chemical engineering; Post-harvest and other agro/bio-technologies; Energy; Machinery development; Surveys and analyses; Ecology and environment; Dissemination of information; and Science, technology and development studies. Progress in basic research pursued by the Council is presented in a separate section.

The Council had achieved a major breakthrough last year in the capability of deep-sea mining. This year it played a key role in organizing the first Indian expedition to Antarctica. The expedition established in Antarctica an unmanned solar-powered weather station, *Dakshin Gangotri*, operational for a year.

Under the Indian Technical and Economic Cooperation Programme, a pilot plant for the production of calcium carbide was set up in Burma for Central Research Organisation (CRO), Rangoon. CRO was also assisted in the setting up of a pilot plant for the production of terpineol, based on CSIR technology.

Under a collaborative project with Bengal Immunity Co., Calcutta, concerning the process for manufacture of chloroquin phosphate, re-standardization studies were completed on a laboratory scale and confirmatory trials for about half of the process steps were completed for a 4-tonne/annum plant.

The process for a new non-steroidal anti-inflammatory and anti-arthritic drug, Salai guggal, ex-*Boswellia serrata* was released to Gufic Pvt. Ltd, who were marketing the drug under the brand name Sallaki. The drug is free from side and adverse effects normally associated with the known group of anti-arthritic drugs. The council earned a sum of about Rs 3.2 lakh as royalty on Tromaril, an anti-inflammatory/anti-rheumatic drug.

The technology for the production of rutin, a vitamin-P like substance (P for capillary permeability controlling fac-

tor), was released for the first time. A new process was developed for vitamin B_6.

Other important chemical products which were developed/released to industry include: gallic acid for pharmaceutical industry; Chloropyriphos, a broad-spectrum organophosphorus insecticide; N-tridecyldiisopropanolamine, an intermediate in the manufacture of the fugicide Tridemorphs, and terpentine oil.

A plant capable of fractionating 8 lakh litres of turpentine per annum was designed and fabricated for Jammu Pine Industries. The plant produces high purity α-pinene, β-pinene, Δ^3-carene, etc.

Diamines and Chemicals Ltd, Kalol, Gujarat, started the production of ethylenediamine and polyamines at their Vadodara plant. The plant, based on the know-how developed through the joint efforts of CSIR and the firm, has a capacity to produce 1200 tonnes/annum of amines valued at about Rs 60 million.

A plant to manufacture 1000 tonnes/annum of the plasticizers tributyl and acetyltributyl citrates was under construction on the basis of CSIR know-how. Owned by Sturdia Chemicals Ltd, the plant would have annual production worth about Rs 25 million.

A novel oxidation technique for converting coal into water-soluble polycarboxylic acids by using air and nitric oxide was developed. These acids are a good source of a host of aromatic and aliphatic chemicals and serve either as a base or intermediate in the synthesis of ion-exchangers, plasticizers, resins, fertilizers, etc.

An Al-based bearing alloy containing Pb(PM401) for floating bush type applications was developed as a substitute for conventional class IV bronze bushes. The performance of the bushes fitted on loco engines was better than that of the bronze bushes. Also, manufacture was started of catenary wire for railway and multistrand overhead conductor based on the high-strength, medium-conductivity aluminium alloy conductor NML-PM215.

In metallurgy, know-how was developed for producing sponge iron by using non-coking coal as reductant. Also developed was a process for sponge iron, which did not require any external reductant.

Under a Department of Science and Technology sponsored project on the preparation of solar-grade silicon, metallurgical-grade silicon was purified to polycrystalline silicon for photovoltaic applications. Parameters for solvent refining were optimized.

With a view to economizing on energy consumption a new electrolytic cell for the production of magnesium was designed, fabricated and operated. The energy consumption could be brought down from 15 kWh per kg of magnesium metal as against 22-25 kWh/kg.

The basic engineering package containing the final part of design information for a 400 tonnes/annum Chlorfenvinphos (an organophosphorus pesticide) plant was completed and delivered to the sponsor National Organic Chemical Industries Ltd, Bombay.

Processes for the preparation of theophylline, aminophylline and caffeine were developed, on sponsorship basis, for a private industry in Pune. Also developed were processes for vapour-phase oxidation of toluene to benzaldehyde and hexachlorocyclopentadiene.

A water-softening plant (1000 m^3/day) based on continuous counter-current ion-exchange was designed and commissioned in the premises of Mahalaxmi Textile Mills, Bhavnagar.

The design of laboratory model of an ocean thermal energy conversion plant (200 W) was completed and its fabrication was in progress. A 96 V 300 Ah powerpack fabricated and fitted on board a vehicle at Vehicles Research and Development Establishment, Ahmednagar, could run it to a distance of 65 km at 40-45 km/hr.

Projects on machinery/equipment development included those related to: compact and light-weight and mini-tractor, paddy harvester, cube ice machine, cashew shelling machine, hand-operated hydraulic press for extracting cocoa butter, semi-mechanized brick-making machine, and a system for detecting hot journal boxes of trains.

The R&D work on post-harvest technologies was concerned with: manufacture of liquid fruits, soft beverages based on orange and lime-lemon flavour blends, ginger oleoresin plant, *n*-triacontanol from tea industry waste, pepper powder, bottled coconut water, and hops cultivation. Agrotechnologies were concerned with cinnamon, *Dioscorea floribunda*, *Eucalyptus macrorhyncha*, *E. youmanii*, pyrethrum, ergot, etc. Technology for cultivation of *Spirulina platensis*, an underexploited protein-rich blue-green alga, for use as poultry feed was in an advanced stage of development. A detailed design information package for citronella distillation plant of 1000 kg per batch capacity was prepared and handed over to Hocitrill Distillation Co, Makum.

A substance which acts as an inhibitor of the triggering of cell division by regulating the uptake of essential nutrients has been isolated and purified to homogeneity; it is an anionic protein present in the intercellular material of rat liver. Work on proteins from bovine seminal plasma was continued.

With the release of 55 new processes during 1981-82 the total number of CSIR processes with the industry by the end of the year was 1348; of these, 597 were reported to be in production. As many as 27 processes went into the production during 1981-82. A sum of Rs 840.00 lakh was realized as the contract value of sponsored projects (601); of these, 150 projects were completed. The CSIR laboratories had in hand 440 consultancy assignments valued at more than Rs 85.54 lakh. One hundred and

eighty-three assignments were completed.

Ninety patents were filed, 37 patents were accepted, and 49 patents were sealed in India. Six patents were filed abroad. Premia/royalties received through National Research Development Corporation of India amounted to Rs 80.648 lakh.

The financial inputs of the council amounted to Rs 8571.963 lakh—Rs 4818.335 as non-plan component and Rs 3753.628 as plan component. □

EXTRAMURAL RESEARCH

Hydrodeheterogenation of model compounds found in coal

The emission of sulphur and nitrogen oxides as a result of the burning of low-grade coals poses serious ecological problems. For reducing the emission of these oxides, either the oxides could be removed after combustion of the fossil fuel, or the sulphur and nitrogen derivatives could be hydrodeheterogenated prior to combustion.

Hydrodesulphurization by a number of heterogeneous catalyst systems has been studied by many workers. Many of these catalysts are known to be active as metal sulphides and it is believed that the catalytic activity of the sulphide is related to crystal lattice defects. Because of the complexity of the heterogeneous system the actual role of the metal in hydrodesulphurization is not well understood. Even less information is available on hydrodenitrogenation process.

In a CSIR research scheme granted to him, Dr R.D. Verma of the Chemistry Department of Panjab University, Chandigarh, is investigating the hydrodeheterogenation of model compounds found in coal by making metal complexes of the ligands and studying their decompositions under hydrogen at high temperatures and pressures. The ultimate aim is to determine the rôle of the metal in the hydrodeheterogenation process, the mechanism of the process, and the factors that influence the rates and mechanisms of the hydrogenation.

Thiophene, benzothiophene, quinolines, and carbazole will be the heteroatom ligands to be studied first as they are present in greatest abundance in solvent-refined coal. Mo^{6+} and W^{6+} complexes of the type $M_2O_2L_2X_2$ (where M is metal, L is heteroatom ligand, and X is monovalent anion) are being synthesized and characterized by infrared and ^1H and ^{13}C NMR spectra. Following characterization, their decomposition in an autoclave under hydrogen pressure will be studied. After investigating the hexavalent complexes, the principal investigator will take up M^{5+} complexes. A series of complexes with the heteroatom ligands corresponding to the formulation MoL_2Cl_3 will be prepared. Reactivities of these complexes will be examined, as also of the reaction products, and compared with those obtained from the hexavalent state. Similar studies will be carried out with Co^{3+}, Co^{2+} and Ni^{2+}. □

PERSONNEL NEWS

Appointments Promotions

Shri S.D. Bakare has been promoted, consequent on assessment, as Scientist C (18 Feb. 1980) and Shri S.R. Mhaswade as Scientist A (26 Dec. 1979) at National Chemical Laboratory (NCL), Pune.

Also at NCL, the following have been promoted as Section Officer: Shri P.K. Maheshwari (25 Oct. 1982) and Shri B.M. Gowaikar (29 Oct. 1982).

Honours & Awards

IRC awards to CRRI scientists

Two papers published by the scientists of the Central Road Research Institute (CRRI), New Delhi, in *Journal of Indian Roads Congress* have won the Indian Roads Congress (IRC) awards. These are: (i) a systems approach to rural road development by C.G. Swaminathan, N.B. Lal, and Ashok Kumar [42 (1981), 885], and (ii) Free speeds of vehicles on Indian roads by L.R. Kadiyali, E. Viswanathan, and R.K. Gupta [42 (1981), 387]. The authors of the first paper have won IRC medals and the authors of the second paper have been awarded a commendation certificate.

Prof. Swaminathan, CRRI Director, who has pioneered research on rural road development, had earlier won the IRC Medal [*see CN*, 31 (1981), 71].

Shri Kadiyali, study director of the road user cost study in India, has just completed a cooperative research project jointly sponsored by the Government of India and the World Bank, for which CRRI is the implementing agency. □

Transfers

Shri N. Jayaraman, Scientist EI, of Structural Engineering Research Centre (SERC), Roorkee, has been transferred to SERC, Madras (22 Oct. 1982).

Retirements

Dr (Kum.) S.B. Kulkarni

Dr (Kum.) S.B. Kulkarni, Scientist EII, of National Chemical Laboratory (NCL), Pune, retired on 30 November 1982, after 32 years of service.

A specialist in heterogeneous catalysis, Dr Kulkarni has done extensive work on synthetic zeolites. She has developed, for example, processes for the manufacture of molecular sieve zeolites of type A, X and Y and high-silica zeolites of type ZSM-5. Based on the high-silica zeolites, NCL has developed catalysts and processes for alkylation, isomerization, etc.

During her earlier years at NCL, Dr Kulkarni carried out basic research in surface chemistry and was associated with the development of *n* long-chain compounds from cottonseed oil for control of water evaporation. It may be mentioned that the usefulness of the monomolecular films of *n* long-chain alkoxy ethanols for water conservation has been established in field trials in the semi-arid regions of Maharashtra.

A member of Royal Institute of Chemistry, London, Catalysis Society, and Thermal Analysis Society of India, she has 70 papers to her credit. □

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CBRI provides prefab shelters for Antarctica expedition team

A prefabricated, permanent-type shelter to accommodate the members (28 in all) of the second Indian expedition to Antarctica has been designed and fabricated by Central Building Research Institute (CBRI), Roorkee. The temperature at Dakshin Gangotri region of Antarctica goes down to as low as −35°C during winter months and to about −5°C during summer. The region is also subjected to strong winds, of up to 65 nautical miles per hour, producing severe wind loads on any structure. These parameters, in conjunction with the constraints in transportation of materials to the site, render the use of conventional building materials unsuitable.

The structural system of these shelters consists of 3 m long (overall maximum dimensions) structural aluminium alloy sections, broken into smaller lengths for ease in transportation. The total weight of the structural components of each shelter having a floor area of about 24 m^2 is about 1550 kg only, while none of the individual components (including stainless-steel nuts and bolts) weighs more than 25 kg. Fibreglass-reinforced plastic sheet (2.5 mm thick) forms the outer surface of the cladding panels. Polyurethane (75 mm thick) has been used as a thermal insulating layer, while plastic-coated laminated teak ply, as the inner face of these composite panels. The total weight of the floor, wall and roof panels for each shelter is of the order of 2 tonnes, while none of the panels weighs more than 40 kg.

Keeping in view the shortage of time available for erection at site and the absence of proper facilities for excavating foundations, the shelters have been provided anchorage by driving stainless-steel spikes through holes in 32 mm thick plate welded to the base of the columns. Further, polysulphide putty is used in-situ to close all possible gaps between the different building components to make the whole structure airtight.

The whole project was completed in a record time of 50 days by a team of CBRI's scientists. According to the reports available, both structures have been successfully erected by the expedition team in Antarctica. □

Chilli oleoresin plant commissioned by CFTRI

The Central Food Technological Research Institute (CFTRI), Mysore, has commissioned a chilli oleoresin manufacturing plant of Chillies Export House (P) Ltd at Virudhunagar, Tamil Nadu. Set up with the CFTRI know-how the plant can handle one tonne of chilli per day to produce 120-150 kg of standard oleoresin. It can also produce oleoresins and essential oils from other spices including pepper, ginger, turmeric, and cardamom.

The CFTRI know-how for the production of oleoresins has so far been released to 25 parties for commercial utilization. □

CFTRI Technologies

New food products/processes developed by Central Food Technological Research Institute (CFTRI), Mysore, include: carbonated coffee, quick curd, fish pickle, and *paneer* (cheese) from vegetable proteins. The laboratory has also developed a plant extract coating for prolonging the life of fruits.

Carbonated coffee

This is a novel, refreshing carbonated beverage from coffee brew formulated under a collaborative project with Coffee Board. The beverage has a pleasing taste and the aroma of coffee, with a shelf-life of a month under refrigeration, and is best relished as a cold drink. The major ingredients of the beverage are coffee extract, sugar, acid, flavours, and a preservative. The coffee extract is prepared from medium-roasted, coarsely-powdered coffee seed. The brew is cooled, centrifuged and carbonated. The product holds out a good market potential both in India and abroad. The process is ready for commercialization.

Quick curd

This can now be prepared in almost an hour through a dry mix formulation. The formulation is stirred in milk to which the previous day's curd of good quality is added, and an hour later, a smooth, hard-set, mildly acid curd with good texture and flavour is obtained. The mix can be packed in aluminium foil laminated films and keeps well for three months.

Fish pickle

CFTRI has worked out an improved process to prepare good-quality pickle

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using low-market-value fish like shark and marine catfish. The pickle stays well for a year without refrigeration.

Different from traditional methods, the CFTRI process consists of frying the fish in oil, preconditioning it in an acid-salt bath, and mixing it with spiced medium of salt, sugar and tamarind. The product is bottled after adding the covering oil. Other comparable species of fish and prawns also can be used for making pickles by this process. To impart a better taste, vinegar, used traditionally for pickling fish, has been replaced by tamarind.

Paneer from vegetable proteins

Paneer is a form of cheese normally made from milk, and is used as an important ingredient in cooked vegetables. A product comparable to paneer has been developed by using a blend of milk and groundnut flour.

Plant extract coating

The coating comprises essential oils and phenolics that are non-toxic, prevent microbial spoilage, and do not affect the natural gloss of fruits.

Experiments carried out by CFTRI have shown that oranges coated with the plant extract can be kept up to 20 days longer at room temperature than their normal shelf-life of about 10 days, *mosambi* for 30 days instead of 12 days and lime for 12 days instead of 5 days. Work is under way to establish the efficacy of the coating on other fruits and vegetables. □

NAL undertakes projects for DOS and DERL

The National Aeronautical Laboratory (NAL), Bangalore, has entered into agreements with the Department of Space (DOS), and Defence Electronics Research Laboratory (DERL), Hyderabad, on two new projects. These concern establishment of an acoustic test facility (ATF) at NAL for DOS, and development of metal capsules for electronic equipment pod for DERL.

Acoustic test facility

This project has been awarded to NAL following the laboratory's feasibility study, undertaken at the instance of DOS, for the designing and setting up of an ATF for carrying out tests related to satellite and launch vehicle programmes. Under the project, NAL would set up ATF for testing: (i) fully integrated spacecraft and space components and (ii) interstages, base shroud and equipment bay of the polar satellite launch vehicle class. The existing air compressor/receiver system at NAL would supply the facility with clean, oil-free air. The facility would comprise 300 m^3 and 20 m^3 reverberation chambers, and a 3 m^2 progressive wave tube—all within a 1000 m^2 building. The work involves the establishment of the facility with all the hardware including pneumatic distribution and control system, acoustic drive system and signal-processing and spectral control system.

This nationally important project would be executed in two phases: (i) establishment and commissioning and (ii) maintenance and running. Expected to be completed by 1986, the project would cost about Rs 17.5 million.

Metal capsules

This project envisages the development of metal capsules for electronic equipment pod (EE Pod) being developed by DERL.

The programme is an extension of NAL's work on aerodynamic data generation and development of composite radomes. Additional work includes development of metal capsule and integration of radomes with the metal capsules and testing of EE Pod. NAL has the overall responsibility for designing, developing, fabricating, integrating, and delivering the metal capsule. The fabrication and integration of the metal capsule with composite radomes will be subcontracted to Hindustan Aeronautics Ltd, Bangalore. The project, costing about Rs 94.50 lakh, is expected to be completed in two years. □

Electrothermal Products: CECRI-Industry Get-together

The need to reduce power consumption in electrothermal industries, especially because of the enormous increases in power tariff in recent years, was the central theme of a get-together organized by Central Electrochemical Research Institute (CECRI), Karaikudi. The get-together was held at CSIR Complex, Madras, on 8 December 1982. Inaugurating the get-together, Shri M.V. Murugappan, Managing Director of Carborundum Universal, Madras, called upon industries to modify the equipment and also the pattern of operation by using more efficient control systems in furnaces to economize on energy. In view of the increasing difficulties in procuring high-grade raw materials, he urged scientists and technologists to work on beneficiation of low-grade raw materials. He also spoke on the need to utilize waste heat from furnace gases.

The R&D work on electrothermal products being carried out at CECRI, Karaikudi, and National Metallurgical Laboratory (NML), Jamshedpur, was explained to the representatives from the industry. The get-together also discussed the problems of electrothermal industries as pointed out by the industries' representatives.

The Karaikudi laboratory's work presented at the get-together related to calcium carbide, calcium silicide, and fused alumina. The processes for the production of these products are based on indigenous raw materials. The laboratory has also designed and fabricated a 38 kVA electric arc furnace. The process on calcium silicide has been transferred to industry. In the CECRI process for fused alumina, non-bauxitic raw materials such as waste emery flour, and alumina slag from aluminium foundries, can be utilized, besides bauxite materials. The production of titanium oxide concentrates, by using ilmenite ores of Tamil Nadu and Kerala beaches, is a single-stage electrothermal

beneficiation process and utilizes lesser amounts of acid. As a result, pollution hazards are minimized.

The NML Director, Prof. V.A. Altekar, who also presided, described his laboratory's work on ferro-alloys. The ferro-alloy products, according to him, were worth two-thirds of the total value of electrothermal production in the country, which had almost achieved self-sufficiency in important alloys like iron-manganese, iron-chromium, and iron-silicon.

Among the various points raised by industries' representatives, mention may be made of: (i) difficulties in obtaining high-grade bauxite for fused alumina industry; (ii) problems faced by ferro-manganese industry owing to phosphorus and silica present in the manganese ores; (iii) reduction of power consumption in phosphorus production and also beneficiation of phosphorus ores to make them suitable for phosphorus production; (iv) use of sintered raw materials and also briquetted coke fines in ferro-manganese production; (v) replacement of charcoal, which is becoming very expensive, with other agricultural waste products like paddy husk; (vi) difficulties experienced because of the use of inferior grades of raw materials in obtaining A-grade calcium carbide; (vii) disintegration of chains used for electrode clamps in carbide industry; (viii) separation of high-grade coals from low-grade ones by mechanical means; (ix) problems in using crystalline grades of limestone in the production of calcium carbide; and (x) improving the current density of graphite electrodes.

The get-together recommended, among others, that: (i) the arc furnaces established at CECRI and NML be more extensively used for evaluation of raw materials with a view to improving the existing processes; and (ii) joint efforts by R&D institutions and industry be made for developing ultra-high-power graphite electrodes.

The get-together also recommended the formation of an association of manufacturers of electrothermal products which could bring to the knowledge of the Government the industries' problems. The association could also, it was felt, sponsor projects, for example energy-saving studies, at R&D institutions. □

Metallic Coatings: CECRI-Industry Get-together

With a view to familiarizing the industry engaged in the manufacture of plating chemicals and the like for corrosion protection, and also the concerned public undertakings with its R&D activities, the Madras unit of Central Electrochemical Research Institute (CECRI), Karaikudi, organized a get-together on Metallic Coatings. These coatings are required for corrosion protection as well as for decorative purposes. At the get-together, held on 7 December 1982 at CSIR Complex, Madras, CECRI scientists presented their work through ten papers and paid attention to specific problems posed by representatives from industrial outfits.

Presenting CECRI's work relating to Mangalore Harbour Project, Dr S. Guruviah showed that aluminium/zinc-sprayed coatings on mild steel panels have longer life (4 years) in comparison with other coatings (2-3 years). Exposure tests at Mandapam and Madras had shown that the aluminium-sprayed coating was more suitable in a marine environment and the zinc-sprayed coating, in an industrial marine environment.

On the performance of cadmium versus zinc for wire healds used in textile industry, Shri S. Sreeveeraraghavan showed that, under the conditions obtaining in a weaving shed, cadmium coatings enhance the life of wire healds and are more economical than zinc or tin coatings.

Some of the other pieces of CECRI work presented were concerned with: copper plating on stainless steel, hard chromium plating, chromized steel, solar absorber coatings and solar foil, aluminium-zinc alloy hot-dip coating, nickel-iron alloy plating, nickel-chromium plating, and amorphous alloy coatings by electrodeposition.

Work on high-temperature coatings done at Defence Metallurgical Research Laboratory, Hyderabad, was presented by one of its scientists. A representative of Bharat Heavy Electricals Ltd, Tiruchirapalli, suggested that CECRI might take up work on high-temperature paints, which had wide applications in nuclear industry. With regard to corrosion of forms and stamps, a problem faced by Neyveli Lignite Corporation, it was suggested that CECRI could be referred to for solution. A representative of Prototype Development and Training Centre, Rajkot, mentioned the difficulties in getting uniform and controlled platings of chromium.

Other suggestions/queries related to the development of protective coatings for marine applications and continuous plating of zinc on mild-steel wires.

The CECRI Director, Dr K.S. Rajagopalan, apprised the industries' representatives of the current areas of research taken up by his laboratory. These included, for instance, ternary alloys, continuous plating, nickel seal and microporous chromium, effluent treatment, and plating for electrolytic industry. He also made a mention of the development by CECRI of the zinc-rich paint based on sodium silicate for use in high-temperature applications. He also pointed out that powder coating could be used in place of the conventional painting to overcome hydrogen embrittlement.

Shri M. Karuppiah of Tansi Steel and Galvanising Works, Mettur Dam, who in his inaugural address spoke of the enormity of economic losses arising from corrosion, dealt with the various applications of hot-dip galvanizing in the fields of electrical industry, bridges, buildings, marine constructions, railways, and reinforced concrete. He complimented CECRI on its work in corrosion, which, he said, had made a significant impact on industry. □

Shrimp quality as influenced by post-mortem biochemical changes

The effect of preprocessing conditions and pretreatment procedures, prevalent in the shrimp-processing industry in India, on the quality of the raw material has been studied by Kum. S. Godavari Bai at Central Food Technological Research Institute (CFTRI), Mysore. Microbial, chemical and biochemical changes governing the quality of prawns were studied with reference to the nucleotides and their derivatives, as also the free amino acids and glucose which impart the characteristic flavour to shrimp.

Factors encountered in practice, such as the post-harvest storage temperature, holding periods, concentrations of disinfectants (for example, chlorine used in general sanitation and in-plant chlorination), the combined influence of chlorine and the various metallic surfaces coming in contact with shrimp, impurities (for example, calcium and magnesium in common salt used in the pre-treatment practices and pre-processing conditions), the study revealed, influenced the different biochemical changes in the prawns and hence are of prime importance in governing their quality.

Sea-fresh samples and commercial trawler catches differed in the indices of quality. Spoilage of prawns was rapid at ambient temperatures ($30 \pm 2^{\circ}C$). Occurrence of melanosis was prevented by storage of prawns in melting ice. The leaching action of melting ice had a washing effect on the microbial load and the spoilage compounds. However, there were leaching losses of the flavouring components.

The bacteriological quality of the prawn meat was protected by the use of chlorinated water; however, an adverse effect of chlorine was observed on the carotenoids and flavouring principles. Studies on the handling of prawns in different metallic containers demonstrated the suitability of aluminium — next only to stainless steel — utensils and table-tops in protecting the prime quality of the raw material. Colour and flavour of prawns were adversely affected by their contact with galvanized iron and copper surfaces. Chlorine caused additional corrosion and uptake of these metals by the prawn meat.

Calcium and magnesium impurities in the common salt at low levels increased the intensity of colour and flavour and contributed to a firmer texture of the canned prawns; however, the flavouring principles were found affected.

Sensory evaluation of the samples in the different experiments had a close correlation with the objective assessment of quality indices, excepting that no bitterness was observed in canned samples in spite of the high levels of hypoxanthine found in them.

The researcher, Kum. Godavari Bai, was awarded Ph.D. degree (1983) by Mysore University for her thesis based on the study. □

TRAINING COURSES

Course on Stress Analysis

The Structural Engineering Research Centre (SERC), Madras, organized an intensive course on Experimental Stress Analysis Techniques and Applications for the benefit of practising engineers and scientists from 17 to 29 January 1983. Thirty-one participants from private and public sector organizations and government departments attended the course, which covered: Photoelasticity, Moire techniques, Holographic and Speckle techniques, Strain gauges, Optical processing techniques, Static and dynamic measurements, Similitude laws and design of experiments, and Data reduction and numerical methods. In addition to 19 lectures on the above topics, the course included nine invited lectures from outside experts and eleven case studies by SERC's scientists.

The participants also conducted experiments in SERC's experimental stress analysis laboratory to gain first-hand knowledge and experience. Discussion sessions provided an opportunity to the participants to sort out specific problems of their interest with the scientists of SERC.

The valedictory function was presided over by Prof. S. Sathikh, Director, Madras Institute of Technology, Madras, who also distributed certificates to the participants. □

* * *

Training Course in Analytical Instruments

At the request of FAO, Central Scientific Instruments Organisation (CSIO), Chandigarh, conducted a training course in analytical instrumentation for 12 participants drawn from as many countries, namely Cameroon, Chile, Cuba, Ecuador, Fiji, Grenada, Guyana, Malaysia, Mexico, Sri Lanka, Venezuela and Vietnam. The course was held from 17 November to 11 December 1982 after the participants had undergone a two-month training at Central Food Technological Research Institute (CFTRI), Mysore.

The course was followed by a three-day terminal workshop in which the participants interacted with the CSIO and CFTRI faculty members and experts from FAO, UNEP and the Union Ministry of Health.

There were in all 15 technical sessions and 20 practical demonstrations related to the principles, construction and working of analytical instruments.

Practical exercises dealt with the methods and techniques of repairing analytical instruments and efficient handling and maintenance of VTVM, signal generators, cathode-ray oscilloscopes and other test and measuring equipment. Audio-visual instructional aids and screening of a technical film on various aspects of spectroscopy including its applications in analysis of food contaminants were also arranged.

The course was conducted under the guidance of Prof. Harsh Vardhan, CSIO Director, Shri D.D. Puri, formerly of CSIO, and Shri U.H. Narayanan, Scientist in charge of CSIO's Service &

Maintenance Centre at Madras. Prof. Harsh Vardhan distributed certificates to participants at CFTRI and CSIO courses.

* * *

Course on Modern Trends in Signal Processing

A course on Modern Trends in Signal Processing with Applications in Instrumentation was organized by Central Electronics Engineering Research Institute's extension centre at Madras from 16 to 23 December 1982. Fifteen candidates from CSIR laboratories and public and private sector industries attended the course, which comprised about 30 lectures on such topics as transducers, signal conditioners, active and digital filters, data converters, storage of analog and digital signals, multiplexers and demultiplexers, phase-locked loops, sample and hold circuits, and application of microprocessors in instrumentation, besides practical demonstrations.

The course was inaugurated by Prof. H.N. Mahabala, head of the Computer Centre of Indian Institute of Technology, Madras, who also delivered the keynote address on microprocessors and their applications. Referring to the revolution created by microprocessors, the speaker emphasized that future instrumentation would largely depend on microprocessors. Consequently the scope of using microprocessor-based instruments for various applications would entirely depend on software capabilities, he added.

Certificates were distributed to the participants by Shri N. Kumar, Director, Ind-Chem Electronics, Madras, who was the chief guest at the valedictory function. □

Dr R. Sarin of NEERI completes a WHO assignment

Dr Rajkamal Sarin of National Environmental Engineering Research Institute (NEERI), Nagpur, completed a six-week assignment (during 2-22 Sep. and 1-26 Dec. 1982) as WHO consultant to Institute of Hydraulic Engineering, Bandung, Indonesia. The NEERI scientist assisted the Indonesian institute in organizing a national training course on analytical quality control in water quality monitoring. Sixteen personnel from the laboratories under various ministries engaged in the collection of water quality data for GEMS (Global Environmental Monitoring System) programme participated in the course, reports Dr Sarin, who was awarded a plaque of honour by the Indonesian government for his services. Dr Sarin also prepared manuals on laboratory exercises in water quality monitoring, delivered lectures, and guided the participants in laboratory work.

The WHO's assignment to the NEERI scientist is in recognition of the expertise which the institute has developed. In December 1980 NEERI had assisted WHO in organizing a course at Nagpur to train personnel from developing countries for the GEMS programme in water quality monitoring. Earlier, NEERI had also collaborated with Water Research Centre, Medmenham Laboratory, UK, in a programme concerning water quality. □

Scientist-Visitors to CFRI

Prof. Wlodzimierz Kisielow, Director of Petroleum and Coal Chemistry Department; Polish Academy of Sciences, visited Central Fuel Research Institute (CFRI), Dhanbad, for exchanging ideas in coal chemistry and coal liquefaction. During his stay at CFRI (9 to 15 Jan. 1983), Prof. Kisielow held discussions with the Director and senior scientists on the institute's programmes on gasification, coal liquefaction, coal constitution, catalysis, combustion, coal carbonization, and process engineering.

* * *

Dr B.N. Nandi, head of Coal and Coke Division of Energy Research Laboratory, Ottawa, Canada, who visited CFRI on 10 December 1982, delivered lectures on (i) Restoration of coking propensities of low-grade non-coking coals by reducing gases and binder pitches, and (ii) Coal combustion vis-a-vis coal petrography.

* * *

Prof. Ludek Vodicka of the Department of Synthetic Fuels, Institute of Chemical Technology, Czechoslovakia, visited CFRI on 28-29 January 1983 in connection with his study tour in India under the Indo-Czech exchange programme. The Czechoslovakian scientist showed keen interest in synthetic fuels, formed coke technology, coal structure studies and coal fertilizers, coal-to-oil conversion and catalysts—all being his fields of specialization. An expert in instrumental analysis, Prof. Vodicka was impressed with CFRI's facilities, especially those of gas chromatography and spectrometry. □

DEPUTATION BRIEFS

Shri R.C. Mangal

As a member of the steering committee of the UNDP project on 'Low-Cost Water Supply and Sanitation Technologies in Developing Countries', Shri R.C. Mangal, Acting Director of Central Building Research Institute (CBRI), Roorkee, attended its first meeting held at Malmo, Bromolla and Gustavsberg, Sweden, from 6 to 8 September 1982. Shri Mangal's report:

The objectives of the project are (i) to develop a low-volume water closet system, and (ii) to carry out investigations into latrine empyting. The steering committee decided that the squatting-type water-closet should be developed with a fibreglass-reinforced plastic in the first instance with a minimum water-seal of 20 mm so that it could be used in the pour-flush system. Later, seals of higher depth of up to 50 mm as well as a detachable rim could be developed for use where flushing cisterns could be provided. The seat should be flushable with 1.5-2.0 litres of water during hand-flushing or with a cistern of, say, 4.5-litre capacity.

Regarding the latrine emptying project, the idea of using a vehicular transport for the purpose was not acceptable, as, in developing countries, vehicles may not be available and only hand-carts may be a suitable mode of transport. In a two-pit system, which is considered most suitable for developing countries, a hand-cart would well serve the purpose, the committee felt.

Shri Mangal also participated in a seminar on Appropriate Technology for Low-Cost Water Supply and Sanitation in Developing Countries (Stockholm, 9 Sep.), which was attended by about 100 scientists including representatives from Sweden, Switzerland and UK, members of the steering committee, and scientists from the Swedish Council of Building Research.

Shri Mangal reports that Dr Duncan Mara of the World Bank, representing the UNDP Technology Advisory Group, highlighted the vastness of the problem and stressed the need for reducing water consumption in cleaning water-closets. In his paper on the work done in India, Shri Mangal pointed out that CBRI had developed several techniques for reducing water consumption and/or cost of water supply and sanitary systems. Some of these techniques are the single-stack system of plumbing, dual flushing cistern, low-capacity flushing cistern (6.5 litres), kitchen waste-water disposal system, and pour-flush water-seal latrine system.

Shri Mangal also visited National Swedish Institute for Building Research, Gavle, and Centre Scientifique and Technique du Batiment (CSTB), Paris. □

EXTRAMURAL RESEARCH

Dielectric behaviour of mixtures of polar liquids

In order to arrive at a better understanding of the circumstances leading to a set of relaxation times, it is useful to examine the dielectric relaxation of mixtures of two polar compounds, the dielectric behaviour of each single compound being characterized by one relaxation time. Polar components of a binary mixture may be both associative or both non-associative. The other types of binary mixtures may consist of one compound which is associative and the other which is non-associative. In view of the relatively small amount of information available on polar mixtures, Dr S.C. Srivastava of the Department of Physics of Allahabad University, Allahabad, proposes to undertake studies, in a CSIR scheme, on dielectric behaviour of mixtures of polar liquids.

Studies have been started on the first type of binary mixtures, viz. (i) chloroform + chlorobenzene, and (ii) bromoform + chlorobenzene. It is proposed to extend the studies to the pairs of, (iii) chloroform + bromoform, and (iv) chlorobenzene + bromobenzene. Binary mixtures whose both components are associative will also be taken up for study, as also the dielectric behaviour of mixtures of polar liquids of the other type i.e. the type in which one component is associative and the other is non-associative.

The binary mixtures in which the compound with the larger relaxation time has a smaller viscosity will be studied in order to ascertain the usefulness of the Debye's model of dielectric relaxation.

Permittivity and dielectric loss measurements are proposed to be made at the frequencies from 0.5 MHz to 250 MHz with help of R-X meter, and at microwave frequencies. The dielectric relaxation studies of these binary mixtures are expected to give some evidence as to the soundness of the analysis of single substances in which two relaxation processes occur. □

PERSONNEL NEWS

Appointments/Promotions

At Structural Engineering Research Centre (SERC), Madras, Dr A. Rajaraman, Shri G.V. Surya Kumar, and Shri P.R. Natarajan have been promoted as Scientists EI (30 Dec. 1982). Their brief profiles:

Dr A. Rajaraman

Dr Rajaraman (born 15 June 1941) is a B.E. from Madras University (1963), an M. Tech. from Indian Institute of Technology, Madras (1965) and a Ph.D. from Indian Institute of Science, Bangalore (1973). Joining SERC in 1970, he has specialized in computerized structural analysis, design and optimization. He has worked on box girders, concrete-steel interaction, nonlinear analysis of cable-supported structures, optimization of prestressed concrete beams and antenna back-up structures and inelastic analysis of prestressed concrete containment vessels. Currently he is engaged in large-scale structural optimization of towers, nonlinear finite element analysis and software development for interactive analysis, and design of trusses and frames. Has 25 research publications and 15 technical reports to his credit.

Shri G.V. Surya Kumar

Shri G.V. Surya Kumar (born 1947) obtained his B.Tech. degree (1968) in civil engineering and M.Tech. degree (1970) in structural engineering with first rank from Indian Institute of Technology, Madras. Joining SERC-Roorkee in 1971, and with SERC-Madras since 1981, he has worked on ferrocement and its application in rural development programmes. Currently he is engaged in the development and implementation of computer software for structural analysis. Visiting FRG during 1976-1978 under the German Academic Exchange Programme, he worked on nonlinear dynamic analysis of structures by using finite elements. He has to his credit about 20 research publications/technical reports, and a patent on production of ferrocement cylindrical units.

Shri P.R. Natarajan

Shri P.R. Natarajan (born 26 June 1942) is a B.E. (1963) from University of Madras and an M.E. (1967) from University of Roorkee. With SERC since 1968, he has been working in the field of steel

structures. At present he is associated with the setting up of a tower-testing station at Pallavaram, Madras. Shri Natarajan was deputed to FRG (1974-75) to receive training in designing long-span steel structures and to UK (1982), where he underwent training in tower testing.

* * *

Also at SERC-Madras, Shri M.V. Dharaneepathy has been promoted as Scientist C (30 Dec. 1982); Shri N.P. Rajamane, Shri T.S. Krishnamoorthy, Shri M. Neelamegam, Shri G. Shanmugam, Shri A. Chellappan, Shri K. Muthumani, Shri K. Natarajan, and Shri A.C. Mani have been promoted as Scientists B (all effective 1 Feb. 1981). Shri S.J. Mohan has been appointed Scientist B (31 Dec. 1982).

* * *

The promotions of Dr S.K. Das and Dr S. Thiagarajan and appointments of Shri K.K. Phani and Shri K.N. Maiti as Scientists EI at Central Glass & Ceramic Research Institute, Calcutta, have been announced [*CN*, 32(1982), 160]. Presented below are brief profiles of these scientists:

Dr S.K. Das

Dr S.K. Das (born 4 Dec. 1936), a graduate from University of Calcutta, obtained his M.Sc. (chemistry) and Ph.D. degrees in 1964 and 1967 respectively from University of London. With CGCRI since 1971, Dr Das has specialized in vitreous enamels, special ceramic coatings, and ceramic and glass colours. He is at present heading CGCRI's Ceramic-Metal Systems Division. His current research interests are heat-resistant ceramic coatings and high-abrasion-resistant glass-ceramic coatings for different metals for various industrial applications. One of his important achievements relates to the process for manufacturing low-cost glazed wall tiles by using cheap and abundantly available Gangetic silt. Has 20 papers to his credit.

Dr S. Thiagarajan

Dr Thiagarajan (born 15 Dec. 1931) obtained his master's degree in physics from Bombay University in 1958 and D.Phil. (science) from Calcutta University in 1971. With CGCRI since 1958, Dr Thiagarajan has specialized in nucleation and controlled crystallization of glasses and has contributed to the development of glass-ceramics of various systems with unique properties; some of them are in an advanced stage of industrial utilization. Currently he is engaged in the development of photochromic glasses, and of abrasion- and corrosion-resistant glass-ceramics from basalts. He heads the CGCRI's Solid State Laboratory. Dr Thiagarajan visited FRG in 1971 under the German Academic Exchange Programme and Japan in 1973 for receiving training in electron microscopy. Has about 20 research papers to his credit.

Shri K.K. Phani

Shri Phani (born Sep. 1948) obtained his B.Tech. (Hons) in mechanical engineering in 1969 from Indian Institute of Technology, Kharagpur. Prior to joining CGCRI in 1982, Shri Phani was with Krebs and Cie (India) Pvt. Ltd. At CGCRI he is engaged in research and development work in fibreglass-reinforced composite materials.

Shri K.N. Maiti

An M.Tech. (1970) in chemical engineering and chemical technology from Calcutta University, Shri Maiti joined CGCRI's extension centre at Khurja, which he heads, in July 1982. Earlier he was with National Test House, Bombay; Hindustan Sanitary Wares and Industries Ltd; Regional Research Laboratory, Jammu; and Tamilnadu Ceramics Ltd, Madras.

Honours & Awards

Dr S. Kumar, Director, Central Glass & Ceramic Research Institute (CGCRI), Calcutta, has been appointed president of the governing body of the College of Ceramic Technology, Calcutta, for a period of three years. Dr Kumar has also been appointed a member of the State Industrial Development Panel on Glass and Ceramics of the Government of Gujarat.

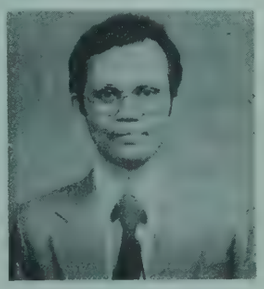
* * *

Dr J.K. Maheshwari, Scientist in charge, National Botanical Research Institute, Lucknow, has been nominated as Chairman of the Scientific Advisory Committee on Natural Resources and Earth Sciences of the Uttar Pradesh Council of Science and Technology for a period of three years.

* * *

Dr R.A. Mashelkar

Dr R.A. Mashelkar, head of the Chemical Engineering Division of National Chemical Laboratory, Pune,



has been elected a fellow of the Indian Academy of Sciences, Bangalore. This honour to Dr Mashelkar is in recognition of his outstanding contributions to chemical engineering. □

Retirements

Dr D.P. Dutta

Dr D.P. Dutta, Scientist EII, Central Fuel Research Institute (CFRI), Dhanbad, retired on 31 December 1982. Dr Dutta, who joined CFRI in 1951, was with Central Mining Research Station, Dhanbad, from 1957 to 1967 before returning to CFRI. At CFRI he carried out X-ray studies on the fundamental nature of coal. At CMRS, where he headed the physics section, he was responsible for building up testing facilities for the mining industry. Again at CFRI he was engaged in X-ray diffraction studies on catalysts, fly ash, mineral matter in coal, etc. One of his research interests included plasma physics. □

CSIR Governing Body

Dr S. Varadarajan, Secretary, Department of Science and Technology, has been nominated a member of the

Governing Body of CSIR till 9 August 1983 in place of Prof. M.G.K. Menon, Member, Planning Commission.

Prof. Menon has been nominated a member of the CSIR Society till 5 June 1984. □

Obituary

Dr Atma Ram

Dr Atma Ram, a former Director General, Council of Scientific & Industrial Research, and Secretary to the Government of India (1966-71), passed away in New Delhi on 6 February 1983. Dr Atma Ram also held

the prestigious chairmanship of the erstwhile National Committee on Science and Technology and membership of the Atomic Energy Commission.

Dr Atma Ram was well known for his contributions to the indigenous development and manufacture of optical glass when he was Director of Central Glass & Ceramic Research Institute, Calcutta—a CSIR constituent which owes its origin and growth almost entirely to Dr Atma Ram's vision and hard work. Optical glass being a strategic material for defence as well as for optical instruments industry in general, Dr Atma Ram's contribution and sustained interest in this field helped the country achieve self-sufficiency in this vital commodity.

Dr Atma Ram's contributions in the fields of physical chemistry and glass and ceramics are also well recognized. He had also authored a book on the history of science.

A strong advocate of a national technology policy, Dr Atma Ram did find, much to his relief, a policy enunciated only a few weeks before his death.

A leading Indian personality in applied research, Dr Atma Ram stressed the need to distinguish between science and technology. He strongly advocated that science is international and technology is not. 'Science produces knowledge, technology helps produce wealth' is what he often emphasized in his addresses. Yet another distinction between science and technology as stated by him is: "Science is judged by excellence, technology by returns—economic and social." The CSIR President paid this tribute to him in 1971 when he retired: Dr Atma Ram has brought distinction to India in the field of applied research. Smt. Indira Gandhi also said: Dr Atma Ram tried to give an economic direction to the policy of CSIR.

A fellow of the Indian National Science Academy, Dr Atma Ram was intimately associated with the academy and contributed in considerable measure to help the academy attain an international status.

Condolence meetings were held at CSIR Headquarters and laboratories on 7 February at which rich tributes were paid to the former head of CSIR. The Council's constituents remained closed for the day as a mark of respect to the leading figure in Indian science and technology.

For a fuller account of Dr Atma Ram's scientific and professional attainments, see *CN* 16(1966), 1. □

COUNCIL OF SCIENTIFIC & INDUSTRIAL RESEARCH

Advertisement No. 3 83

It is proposed to appoint two Scientists F (scale of pay: either Rs 2000-125/2-2500 or Rs 2250-125/2-2500-EB-125/2-2750) for National Aeronautical Laboratory (NAL), Bangalore.

One of these senior positions is in the disciplines of crystallography, metal physics, and high-pressure physics of NAL's Materials Science Division. The other position is in the discipline of structural mechanics with particular emphasis in vibrations and aeroelasticity.

Further details about the posts and prescribed pro forma for sending curriculum vitae obtainable from Joint Secretary (Administration), CSIR, Rafi Marg, New Delhi 110001. Deadline for receipt of applications at the above address: 11 *April* 1983.

Advertisement No. 5/83

The Council proposes to appoint Director for Central Electrochemical Research Institute (CECRI), Karaikudi.

The institute has the main objective of conducting industrial/applied research in electrochemical science and technology. Research and development work is carried out in seven areas of electrochemistry: (1) Electro-inorganic and electro-organic products, (2) Electrothermics and electrometallurgy, (3) Electro-deposition and metal-finishing, (4) Batteries, (5) Corrosion and its prevention, (6) Solid-state electrochemistry, and (7) Fundamental electrochemistry. The institute has established field stations for carrying out investigations on corrosion under tropical conditions. It also conducts training courses annually in electroplating, storage battery technology, and corrosion and its prevention.

The Director is expected to provide a high-level leadership in the formulation and implementation of R&D programmes and projects at a national level in electrochemistry. He should be able to plan and execute programmes of national importance by identifying the role of the institute in the total energy perspective of the country in the years to come. He should have the ability to establish rapport with academic and professional institutions and governmental agencies dealing with all aspects of development of electrochemistry and connected disciplines.

Qualifications & Experience: High academic qualifications in chemistry/chemical engineering/metallurgy with proven record of excellence in research and development in areas related to electrochemistry as well as aptitude for R&D management.

Salary/Conditions of Service: The scale of pay attached to the post is Rs 2500-125/2-3000 plus allowances in accordance with the central government rules. High initial pay may also be considered. Consultancy earning subject to an upper limit of Rs 15,000 per year is permitted. Free medical aid and leave travel concession are also permissible for the family. Residential accommodation in the campus is available on payment of rent.

Age should be preferably below 50 years, but relaxable in deserving cases.

This is a contractual appointment initially for a period of six years. The contract is extendable and the incumbent may also be confirmed.

Those interested may send in their curriculum vitae in the form to be obtained from the office of the Council and send the completed forms to the Joint Secretary (Administration), Council of Scientific & Industrial Research, Rafi Marg, New Delhi 110001, on or before 18 April 1983. Literature about CECRI will also be made available on request. □

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Advances in Electrochemical Energy Storage and Conversion

Four keynote addresses and 12 research papers summed up the recent advances in electrochemical energy storage and conversion at a symposium organized by and held at Central Electrochemical Research Institute (CECRI), Karaikudi, on 21 January 1983.

In his address, Dr K.S. Rajagopalan, CECRI's Director, pointed out that society in the twenty-first century would rely on nuclear (fission or fusion) power, solar power, ocean thermal energy, tidal power, and geothermal energy and that these could be optimally used only if they could be stored and reconverted. One of the best options for energy storage, he said, is the rechargeable batteries and another is an electrolyzer, hydrogen and oxygen storage system, and a fuel cell. He also expressed the view that it is in the field of batteries that we could expect very close rapport between an electrochemical research institute and the industry for the reason that the secondary battery is the electrochemical system *par excellence*. That scientists in research institutes should do such work as its results are immediately absorbed by the industry was his suggestion.

In his presidential address, Dr H.V.K. Udupa, former Director of CECRI and now Emeritus Scientist at Manipal Institute of Technology, Manipal, called for further work on conventional systems of primary and secondary batteries in order to make these functions satisfactory for newer uses intended for them. He mentioned that a number of battery systems such as nickel-zinc, zinc-chlorine, zinc-bromine, nickel-iron, sodium-sulphur, and lithium-FeS_x, and fuel cell systems are being studied in many countries for load levelling, electric vehicles, solar energy storage or efficient power generation.

Delivering the inaugural address, Shri C.B. Ayapa, Managing Director of AMCO Batteries Ltd, Bangalore, emphasized the need for an integrated R&D effort between industries and research institutions in the country for identifying important areas to keep pace with the efforts in the rest of the world. Stating that a battery suitable for one application may not be so for another, he stressed the need for making tailor-made batteries. He also explained the importance of choosing an appropriate electrode system to get maximum energy density, as also of a strategy to work on those systems where there is the least wastage of material, or in which some kind of recycling is possible. He was sanguine that it would be possible to develop an efficient storage battery system, working in conjunction with solar cells, for the benefit of rural populations.

Dr A.V. Joshi, Managing Director of Energy Systems (P) Ltd, Nasik, in his keynote address on 'Trends and prospects of primary and reserve cells' in the first session, pointed out that the lithium cells would find extensive application in future because of their high energy densities, long storage life, and amenability for miniaturization. Solid electrolyte batteries would find application as power sources in electronics equipment in future, he added.

The first paper of the session was devoted to the evaluation of kinetic parameters of the Al/Al^{3+} electrode in propylene carbonate solution. The results pointed to the conclusion that the aluminium electrode may be suitable in the above non-aqueous medium. Another paper dealt with discharge characteristics of lithium-MnO_2 cells, in which the authors showed that the lithium cell system containing $LiClO_4$ in propylene carbonate as electrolyte could operate very efficiently at low discharge rates. On the performance characteristics of Mg-MnO_2 cells, it was shown that cells with magnesium perchlorate as electrolyte possess better voltage characteristics even at higher current drains than cells with $MgBr_2$ as electrolyte, according to another paper presented at this session.

The keynote address of the second session was delivered by Dr K.S. Rajagopalan, who gave production statistics of the dry cells (leclanche type and magnesium dry cell), lead-acid battery, nickel-cadmium, and magnesium-based reserve-type cells in the country. Mentioning briefly the R&D efforts in the country on various types of electrochemical power sources, he indicated the prospects for nickel-zinc, zinc-chlorine, lithium-aluminium alloy FeS_2, sodium-sulphur, hydrogen-oxygen cell of the alkaline type,

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phosphoric acid fuel cell, and photoelectrochemical cells in energy storage and conversion. Of the four papers presented, two were on preparation and properties of β-alumina solid electrolyte, which forms an important part of sodium-sulphur system.

The need for research to obtain newer types of lead oxides and doped lead oxides for improving active material utilization in the positive plates of the lead-acid battery system was pointed out in one of the papers. In a paper relating to the development of 96V/300 Ah advanced lead-acid battery for electric vehicles, the improvements effected in the system for achieving an energy density of about 35 Wh/kg were presented. The development of two prototypes of lead-acid battery for test in an electric vehicle was also discussed.

'Redox storage batteries' was the subject of the keynote address of the third session by Dr Vinod Jalan, Director, Energy Systems Research, Giner Inc., USA. In this, the speaker outlined the scope of redox storage batteries for large-scale energy storage, especially for load levelling. Discussing the various possible redox systems, he enumerated the criteria for selecting the chromium-iron redox cell system. He also described the development of lead-gold on a carbon electrocatalyst for the Cr^{3+}/Cr^{2+} and Fe^{3+}/Fe^{2+} redox systems. The iron-chromium redox cell, according to him, is suitable for extended storage applications, i.e. of the order of 40 hr, and that prospects of cost reduction with respect to the tank and $CrCl_3$ are bright.

The results of studies on the electrocatalysis of methanol oxidation by a Pt-Ru alloy, electro-deposited on to platinum, formed the subject of one of the papers. Maximum activity, according to the paper, was exhibited by the alloy containing 25 at.% of Ru.

The other papers dealt with (i) studies on hydrogen and oxygen gas diffusion electrodes used in low-temperature alkaline hydrogen-oxygen fuel cell, and (ii) performance characteristics of low-temperature alkaline hydrogen-oxygen fuel-cell modules.

In the fourth session, Prof. S.K. Rangarajan of Indian Institute of Science, Bangalore, delivered the keynote address on 'Modelling electrode process', in which the speaker explained the need for understanding porous electrodes of the two-phase and three-phase system types, and presented a brief account of the earlier models regarding porous electrodes, proposed by different researchers. He showed how for a two-phase system, i.e. a flooded battery system, modelling (electrode processes) could be achieved by using the theory of over-potential transient response resulting from the application of an exponentially decaying current. He demonstrated how, by this method, potential-time profiles can be employed to derive the basic parameters characterizing the performance of porous electrodes.

One of the papers pointed out that in selecting the miniature cells for any particular equipment, the basic parameters to be taken into consideration are: (i) selection of chemical system, (ii) mechanical design, and (iii) electrical parameters. An account of photoelectrochemical solar cells and their efficiencies, studied by various researchers, was dealt with in the other.□

UNU workshop suggests a network of food information service for developing countries

Formation of a cooperative network for exchange of information in food science and technology and nutrition was the centrepiece recommendation of a workshop held at Central Food Technological Research Institute (CFTRI), Mysore. Held under the sponsorship of United Nations University (UNU) and CFTRI from 18 to 24 January 1983, the workshop was titled 'Need-based Information Service in Appropriate Food Science and Technology for Developing Countries'. Information specialists, food scientists and technologists and nutritionists from as many as 13 countries of Africa and Asia—Bangladesh, Ghana, Guatemala, Indonesia, Japan, Korea, Nepal, Nigeria, Senegal, Sri Lanka, Sudan, Tanzania, and Thailand—participated in the workshop, besides representatives from UNU and International Development Research Centre, Canada.

The need for the information network was felt with the realization that the lack of adequate information dissemination mechanisms in developing countries had created an imbalance that must be made up. The information on food science and technology and nutrition made available by the developed countries was very expensive, and being oriented, as it was, towards meeting their own needs, was sometimes of marginal value to developing countries.

The workshop urged UNU to take initiative in assisting the participating countries in the formation of a task force to develop the cooperative network. The possibilities of involving other institutions of the participating countries as well as in the region could also be explored by UNU. As a first step, the existing information services of CFTRI were sought to be made available, with suitable enlargement to cover Asian and African needs, to the participating institutions as a prerequisite for the development of the inter-institutional information network.

The need to organize training programmes in institutions having expertise and facilities was emphasized. In this regard, the workshop suggested the compilation of a directory of training institutions, including their facilities and course details. It also suggested programmes on information awareness to keep policy makers, planners and managers better informed.

The workshop recommended that information on developing countries' food products, which are based on traditional art-based technologies, should be collected, sifted, documented,

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and disseminated with a view to their further technological and scientific development.

Earlier, while inaugurating the workshop, Prof. S. Nurul Hasan, Vice President of CSIR, said that the real challenge before scientists, especially those working in developing countries, was how to identify the source and availability of information and the means of obtaining it. Unless these aspects received due attention, it would be an exercise in futility, resulting in wastage of human and material resources, and of research projects which would amount to rediscovery and duplication. To make use of information which was being generated at a phenomenal rate, it was imperative that there should be a proper and effective infrastructure which could help take the knowledge to the far-flung areas in the developing countries, Prof. Hasan added.

The CSIR Vice President wanted the developing countries to join hands in order to optimize their resources and build cooperative activities for meeting their specific needs. The first challenge would be, therefore, to identify the needs clearly. He hoped that if the workshop could initiate an inter-country and inter-regional activity for exchange of information in food science and technology and related fields, it would be a major step towards resource-sharing and accelerating the pace of development of nations.

In line with the policy of the Indian government to share knowledge and experience with all developing countries and to correct the existing imbalances between nations, Prof. Hasan, on behalf of CSIR, offered sharing of resources and experience of the country with other developing countries. He appreciated the steps taken by UNU in laying emphasis on freedom from hunger, food, poverty, resources and environment, as well as on ethical utilization of science and technology.

Dr H.A.B. Parpia of UNU, who presided over the inaugural session, said that the problem of food called for a multidisciplinary approach. Mere increase in food production without due attention to aspects like conservation and storage would not solve the problem. The development of food in relation to poverty and nutrition called for effective utilization of information. In this regard, he stressed the need for an efficient system of information service.

Thirty-eight papers were presented and discussed in eight technical sessions. Besides, a number of state-of-the-art reports on information infrastructure in food science and technology were presented.

CFTRI library building's foundation-stone laid

The CSIR Vice President laid the foundation-stone of CFTRI's library building on 18 January 1983. The building, when completed, will also house the food science and technology information service of the institute and the National Information Centre for Food Science and Technology. □

Pharmacological Techniques for Evaluation of Natural Products

A 10-day Unesco workshop on the title topic, organized by Central Drug Research Institute (CDRI), Lucknow, was held from 18 to 27 October 1982. The workshop, attended by seven delegates from Afghanistan, Bangladesh, Nepal, Pakistan and Sri Lanka, and 11 Indian participants, besides 10 observers from CDRI, coincided with the SCAMAP* council meeting.

Inaugurating the workshop, Dr Akhtar Hussain, Director, Central Institute of Medicinal and Aromatic Plants, Lucknow, stressed the importance of medicinal plants in the treatment of diseases and the need to evaluate them scientifically. An 'Annotated Bibliography of Publications on Medicinal Plants from CDRI' was released on the occasion. A Unesco-sponsored poster exhibition on 'Ecology in Action' formed part of the workshop.

The programme included three invited lectures. One of them was by Prof. Ata-ur-Rahman (Co-Director, H.E.J. Research Institute, Karachi), who, reviewing the work done in his laboratory, reported the isolation of a number of new compounds: two alkaloids—karachine and taxilamine—from the root bark of *Berberis aristata*; three alkaloids—strictalamine, rhazimal and rhazimol—from *Rhazya stricta*; a sapogenin—nahagenin—from *Fagonia indica*; a triterpenoid—karachic acid—from the bark of *Betula utilis*; cucurbitacin Q-1 from the fruits of *Cucumis prophetarum*; an alkaloid—papilamine—from the leaves of *Buxus papillosa*; and elucidation of the structures of lorenthol (a triterpenoid from *Loranthus grewingkii*); and of a new alkaloid from the leaves of *Catharanthus roseus*.

Dr G.P. Wannigama (Department of Chemistry, University of Peradeniya, Sri Lanka) described his studies on the bark of *Holarrhena mitis*, which yields holafebrine, which in turn can be easily converted into pregnenolone, progesterone and cortisone, and also mitiphylline in large amounts. He traced the origin of *Holarrhena* species to South America from where it has spread in the south-western direction. Also reported were the isolation of three coumarins from *Triphasia trifoliata* and determination of the structure of one of them. While elucidating the fate of organic compounds in the natural environment, Dr Wannigama cited the example of the change in the fatty acid composition of dead leaves of *Avicennia marina* after bacterial infection.

Dr Akhtar Hussain reviewed CIMAP's work on the improvement of medicinal and aromatic plants to obtain higher yields of useful constituents, particularly those relating to lemon grass, Citronella Java, *Mentha piperita*, *Catharanthus roseus*, and *Pyrethrum*. He reported the development of a strain

*South and Central Asian Medicinal & Aromatic Plant Network

of *Claviceps paspali* which gives a high yield of ergot alkaloids in submerged culture and also the isolation of a new strain of *Aspergillus* which produces ergot alkaloids in a saprophytic culture.

Review lectures by CDRI's researchers Dr B.N. Mehrotra, Dr S.P. Popli and Dr B.N. Dhawan highlighted their experiences in the multi-disciplinary investigation of thousands of plants over almost two decades. The lectures indicated possible approaches to work on medicinal plants.

The different tests employed in biological screening of plant materials were explained in detail by CDRI's scientists through 14 lectures and practical demonstrations. Statistical evaluation of biological data and the creation of a computerized data base of the results of biological screening of Indian plants were also explained. A lecture on initial clinical trial of candidate drugs also gave an idea of the rules framed by drug control authorities for conduct of different phases of clinical trials.

Dr G.S. Sidhu, Director General, CSIR, addressing the participants on 22 October, stressed the need for a continuous exchange of information between neighbouring countries. He also welcomed the foreign participants to CSIR laboratories for short-term training in specific techniques.

Certificates were awarded to the participants at the valedictory function. □

Technologies for iron-based pigments: RRL-Bhubaneswar

Synthetic iron-based pigments have replaced naturally occurring ones because of the availability of huge quantities of iron-based waste products and byproducts—such as iron chloride, iron sulphate, iron scrap, and iron sludges—which could be converted into synthetic pigments. As the colour, particle size, purity, and bulk density—properties which affect the pigment utility—can be controlled at will in the synthetic methods, synthetic pigments, far superior to natural ones, can be produced.

In India, iron-containing chemicals produced as waste products and byproducts in the vicinity of steel plants cause serious environmental problems if not properly disposed of. The steel-pickling plant of the Rourkela Steel Plant is a case in point, where huge quantities of ferrous sulphate accumulate. Since no indigenous technology was available for converting these waste products into pigments, Regional Research Laboratory (RRL), Bhubaneswar, took up the project, as part of its programme on waste utilization. The laboratory has so far developed synthetic methods for five iron-based pigments. Brief descriptions of the processes:

Iron oxide red pigment

The pigment is produced through a solid-state reaction between hydrated iron(II) sulphate and soda ash, the red oxide formed being separated from sodium sulphate by leaching out the latter with water. Sodium sulphate is a valuable byproduct in the process.

Iron oxide black and red pigments

The process involves a solution reaction in which iron(II) hydroxide is precipitated from iron(II) chloride solution with lime. The iron(II) hydroxide is oxidized to black iron oxide, which is separated and dried. On roasting, the black oxide is converted to red oxide of iron.

Iron brown pigment

This is obtained by controlled oxidation of iron oxide black pigment. It has special applications in defence.

Iron green pigment

This is a novel pigment obtained by precipitating white complex iron(II) ferrocyanide precipitate on a suspension of iron oxide yellow pigment and carefully oxidizing the white precipitate to the blue form. The resulting colour is a green shade, and the product also finds special applications in defence, besides in paints.

Iron blue pigment

An iron blue pigment, which is considerably soft and with a green undertone, is obtained by precipitating white iron(II) complex ferrocyanide and oxidizing it at room temperature. A special coagulant is added to improve its settling and filtration properties.

All the pigments produced meet the Indian Standards specifications and the methods developed are techno-economically feasible, especially for a small-scale industry. As many pigments are still imported, the indigenous technology has the potential to reduce or even eliminate imports. □

CFRI develops a hot-air generator fired by particulate fuels

A cheap source of hot air is required by a number of industries for drying tea, timber, paddy, etc. and for other such purposes. To meet such needs, Central Fuel Research Institute (CFRI), Dhanbad, has designed a generator capable of burning coal, lignite, waste fuels like washery rejects, carbonaceous shales, paddy husk, saw-dust and similar materials in particulate form.

CFRI's generator consists of a fluidized-bed combustor in which particulate fuel is burned at a temperature of 800-900°C on a bed of inorganic material. Heat-transfer tubes containing flowing streams of air inside are kept immersed in the bed. A shell and tube-type heat exchanger mounted over the combustor extracts heat from the hot flue gases leaving the combustor. In this heat exchanger, air flows in the shell side and hot flue gases flow through the tubes. The generator installed at the institute is capable of generating 4000 Nm^3 of hot air per hour at about 200°C. The test unit has been commissioned recently for conducting trial runs. □

CFTRI's consultancy for energy food unit

The Central Food Technological Research Institute (CFTRI), Mysore, has been chosen as their consultant by a cooperative stores in Madurai (Tamil Nadu) for setting up an energy food unit. The unit will have a capacity to produce 6 tonnes of the food per shift (two-shift basis for 300 days a year). The institute has also prepared and provided a comprehensive project report to the stores—Madurai District Pandian Consumers' Cooperative Wholesale Stores Ltd—who are expected to start production by July this year. □

Characterizating close-boiling organic isomers

At Central Fuel Research Institute (CFRI), Dhanbad, Shri Asit Bhattacharjee has synthesized a new compound, rubidium benzenesulphonate (RBS), for use as a new stationary phase in gas chromatography (GC). This has shown an immense potentiality for separating close-boiling organic isomeric pairs. The complete separation of 2,4- and 2,5-xylenols, which had hitherto defied all attempts at satisfactory separation, has been achieved on this phase for the first time. DTA and X-ray diffraction studies on the new stationary phase showed the presence of clathration holes inside the crystal lattice of RBS. Peak tailing being a major disadvantage with RBS phase, the phase has been modified in the detailers like Carbowax 20M with or without ascorbic acid, the latter being used for the first time in GC. Fifteen pairs of close-boiling organic isomers have been successfully separated on the modified RBS phase. Such a large number of pairs of isomers has not been separated on a single stationary phase so far. Some of the resolutions are also the highest so far obtained.

Analysis of phenols without converting them to their ethers is a difficult problem in GC. A new dual-column method has been developed for the analysis of low-boiling phenols by using (i) RBS modified with Carbowax 20M and ascorbic acid, and (ii) Apiezon L grease modified with Carbowax 20M and ascorbic acid as polar and nonpolar phases respectively. The new method has been found to be highly satisfactory for characterizing phenols present in coal-tar acids.

The CFRI researcher has also developed a new rapid method for the analysis of pyridine bases boiling up to 145°C using a modified diglycerol column. The method requires only 7 min. for complete elution of all the bases. Another method which uses PEG400 as stationary phase has been developed for separating quinoline, isoquinolines, and 2-, 4-, 6- and 8-methylquinolines. Both the methods have been found to be rapid as well as satisfactory, particularly for characterizing pyridines and quinolines present in coal-tar bases.

Shri Bhattacharjee has been awarded Ph.D. degree by Indian School of Mines, Dhanbad, for his thesis based on the study. □

Ammoxidation of coal-tar and petroleum-derived hydrocarbons

While studying the catalytic vapour-phase ammoxidation of several dialkyl benzenes and their derivatives and terpenes, Shri Subhash Chandra Ray of Central Fuel Research Institute, Dhanbad, has found that regardless of the length of the alkyl chains, ammoxidation leads to the formation of corresponding phthalodinitriles. The phthalodinitriles are important intermediates in the manufacture of dyes and pigments, agricultural chemicals, polyester fibres, polyamides, and special types of polyurethane foam.

Shri Ray's study was mainly concerned with the working out of optimum process parameters and development of a suitable catalyst for ammoxidation of *o*-, *m*- and *p*-xylenes. The techniques employed for studying the reactions were EPR (peak broadening), X-ray, IR, and DTA. Of the various single oxides, binary oxide combinations and ternary oxide systems tried on several supports, the vanadia-chromia catalyst (of a particular molar ratio) mounted on alumina proved to be most effective. Incorporation of boria to this system enhanced the activity and selectivity towards the formation of terephthalodinitrile and iso-phthalodinitrile from *p*-xylene and *m*-xylene respectively. This change was because of the formation of additional micropores and hence of surface area of the catalyst system. The crystalline form of the vanadia-chromia trioxide system was transformed to amorphous form on incorporation of boria.

A plausible reaction mechanism for ammoxidation of *p*-xylene to terephthalodinitrile has been advanced. The mechanism holds good also for ammoxidation of other xylene isomers.

Shri Ray was awarded Ph.D. degree by Indian School of Mines, Dhanbad, for his thesis based on the study. □

Catalytic vapour-phase oxidation of coal carbonization byproducts into fine chemicals

Shri Subodh Kumar Ray of Central Fuel Research Institute (CFRI), Dhanbad, has investigated the catalytic vapour-phase oxidation of toluene, monomethylnaphthalenes, quinoline, quinaldine and isoquinoline. The object of the study was to develop processes for converting these coal carbonization byproducts into fine chemicals, dyestuffs, and pharmaceutical intermediates.

The oxidation of toluene to benzaldehyde on vanadium pentoxide gave an yield of 20.8 mol. % per pass, the highest reported so far. Here, silica gel as the catalyst support and potassium sulphate as an additive played a significant role. Tin vanadate proved to be the most suitable catalyst for the oxidation of toluene to benzoic acid, giving an yield of more than 37 mol. % per pass: the method of impregnation of the catalyst

on the support influenced the catalytic activity to a great extent. A mixture of vanadium pentoxide and tin vanadate promoted with phosphorus pentoxide was most effective in the oxidation of toluene to maleic acid. The product did not contain any anhydride, usually produced in the oxidation reaction.

Ferric vanadate supported on silica yielded maximum conversion of α-methylnaphthalene to α-naphthaldehyde, whereas in the case of β-methylnaphthalene the highest yield was obtained with the same catalyst when supported on pumice instead of silica. This is for the first time that the formation of aldehydes through controlled oxidation of methylnaphthalenes in vapour phase has been reported; earlier studies report the formation of phthalic anhydride only.

The oxidation of quinoline with vanadium pentoxide led to the formation of pyridine and nicotinic acid. This reaction has also been reported for the first time. The oxidation of 2-methylquinoline on vanadium pentoxide-based catalyst produced quinoline.

In the case of the oxidation of isoquinoline the heterocyclic ring was found to be preferentially attacked and phthalimide turned out to be the main reaction product. This finding is of great significance for two reasons: (i) it provides a method for release of heterocyclic nitrogen through controlled oxidation; and (ii) it shows that the stability of the nitrogen ring depends on the position of nitrogen in the ring.

Shri Ray, who worked under the guidance of both Dr P.N. Mukherjee of CFRI and Prof. J.N. Chakravarti of Indian Schools of Mines (ISM), Dhanbad, was awarded Ph.D. degree by ISM for his thesis based on the studies. □

Industrial Development News

This is the title of a new quarterly being brought out by Regional Research Laboratory (RRL), Hyderabad, from January this year, following its success through a pilot issue brought out in September last year. The periodical covers industrial and technological developments, principally in chemical and allied industries, in the country and elsewhere. Besides feature articles relating to specific industrial sectors, the quarterly includes information on the progress of implementation of new industrial units, statistics of production, imports and exports, industrial licences and letters of intent issued, and other such matters.

The inaugural issue (A4, 20 pages) contains an article on 'Biological Control of Pests and Weeds', covering the global scene. A short feature is on 'Water Hyacinth', focusing the work done on control and utilization of this weed at RRL-Hyderabad and RRL-Jorhat under an inter-country Commonwealth Science Council's programme. Other industrial news items cover the Indian and international scenes.

Enquiries relating to the quarterly may be addressed to: The Director, Regional Research Laboratory, Hyderabad 500009. □

R&D at the CFTRI—Three Decades

The Central Food Technological Research Institute (CFTRI), Mysore, has brought out the title publication, which presents the institute's R&D efforts in more than fifteen disciplines of food science and technology, under five heads, namely commodity research, multi-commodity research, formulated foods, beverages, and other important activities. The publication also gives an account of the services and facilities available in the institute. The R&D reports included cover important technological changes in the post-independent India, following the nation's efforts to attain self-sufficiency in production, preservation, and processing of food.

Technologies transferred to industry, technologies ready for commercialization, consultancy offered to the industry, project feasibility reports, and techno-economic studies are listed in appendices.

The publication would be useful to research workers in institutions concerned with post-harvest technology of food materials, and to scientists, technocrats and administrators in industry and government agencies concerned with the field.

Priced at Rs 100 (exclusive of packing and forwarding charges) the publication can be had from: The Director, Central Food Technological Research Institute, Mysore 570 013. □

TRAINING COURSES

Small Prime Movers

Under the regional rural technology programme of the Commonwealth Science Council (CSC), a training course on 'Design, Manufacture and Testing of Small Prime Movers' was organized at Central Mechanical Engineering Research Institute (CMERI), Durgapur, from 23 November to 6 December 1982. The course was a sequel to an earlier CSC workshop held at Dacca in 1978 which had identified 'Local Manufacture of Small Prime Movers' as one of the projects under the CSC programme. The need for the project was felt owing to the lack of small-engine manufacturing plants, difficulties in the availability of spare parts, and lack of local servicing facilities.

Six participants from abroad—two from Sri Lanka, one from Malaysia, and two from Bangladesh—besides two from India (CMERI), attended the course, which covered internal combustion engines: basic theory of design, developmental testing methods, metrological methods, materials selection and metallurgical analysis, destructive and nondestructive testing, and manufacturing processes. It comprised both theoretical lectures and practical demonstrations on engines (including the one developed and assembled at Mechanical Engineering Research and

Development Organisation, Ludhiana). Practical demonstrations pertained to manufacturing processes and utilization of alternative fuels. For example, an engine was run on a mixture of biogas (water hyacinth-based) and diesel oil. The course was significant from the point of view of technical and scientific cooperation among the participating countries, as Shri O.P. Malhotra, Vice President of Phillips Carbon Black Ltd, said while inaugurating the course. At the valedictory function, certificates were awarded to participants.

* * *

Exploration Geophysics

A six-week regional training course, sponsored by Unesco-CSIR, on 'Methods and Techniques in Exploration Geophysics' was organized by National Geophysical Research Institute (NGRI), Hyderabad. Representatives from four developing countries—Nepal, Iran, Sri Lanka, and Jamaica—attended the course, fifth in the series. Intended for mainly in-service personnel, the course imparted a broad theoretical background and field training in the utilization of geophysical methods for mineral exploration. The course directors were Dr Hari Narain and Dr S. Balakrishna; the faculty included scientists from NGRI, the Geophysics Department of Osmania University, and Geological Survey of India. Prof. David Boyd, Professor of Geophysics and Vice Chancellor of University of Adelaide, South Australia, gave away certificates to participants.

* * *

Production and Analysis of Alcoholic Beverages

A short-term training course on production and analysis of alcoholic beverages was held at Central Food Technological Research Institute (CFTRI), Mysore, from 7 to 25 February 1983 for the benefit of the personnel of the Karnataka State Excise Department. Attended by 14 participants, the course covered background information on the basics of microbiology, including microorganisms and their controlled growth in alcoholic beverages, and methods of analysis of wine, brandy and toddy. An understanding of these aspects would help excise officials in carrying out both qualitative and quantitative evaluation of liquors—the objective of the course. □

EXTRAMURAL RESEARCH

Genetic variation in serum lipoproteins and effects of dietary oils and other factors in mammalian systems

In a CSIR composite research scheme sanctioned at the Department of Botany of the University of Calcutta, Calcutta, the effects of dietary oils in combination with other factors on the cellular components and cell division of man and mammals have been investigated. The two principal investigators were Dr (Smt) Geeta Talukder and Prof. (Smt) Archana Sharma (of the Human Genetics Unit) of the Botany Department with whom worked two CSIR research fellows Smt Bani Gajra and Kum. Supriti Datta.

The researchers screened a human population from Calcutta for serum lipoprotein patterns through electrophoresis and quantitative methods, and found a gradual increase with age in the percentage of lipid-linked abnormalities, namely hyper cholesterolaemia, hypertriglyceridaemia, and combined hyperlipidaemia, the percentage being higher in males than in females. Extending the survey to populations in semi-urban districts like Midnapore, they found that the percentage of such lipid-linked abnormalities was higher in Calcutta (highly industrialized) than in semi-urban and non-industrialized regions.

The study was further extended with a view to determining the role of dietary oils in combination with some known toxic chemicals on the serum and tissue lipids on animal models. Three different types of oils, namely groundnut, rapeseed, and mustard oils, were used in the diet. The level of erucic acid in the first one was almost nil while the acid levels in the two latter oils were about 52% and 40-44% respectively. As these oils constitute the cooking medium, both heated and non-heated oils were used in the experiments. Rats were fed these different oils separately for periods ranging from 21 days to 4 months and later in combination with different pollutants. A hyperlipidaemic effect was induced by rapeseed and mustard oils in both liver and heart tissues following shorter periods of treatment (21 days to 2 months), which may be related to the high erucic acid content.

Quantitative analysis of free fatty acid, cholesterol and phospholipid contents in heart tissues showed that lipid-soluble pollutants, like DDT, influenced these levels appreciably.

In studying the effect of dietary oils alone on the experimental animals the researchers found that most oils, whether hot or cold, induced no effect on the bone marrow chromosomes. Only non-heated groundnut oil induced some chromosome breaking effect, perhaps because of its cyanic acid content. However, when the animals were treated with salts of different metallic pollutants as well as pesticides like DDT, they found that although the lipid fractions as observed by quantitative methods or by electrophoresis were sometimes lower, there was an increase in chromosomal aberrations. This was particularly so after treatment with DDT, arsenic, vanadium, and cobalt. The researchers suggest that the oil diet may act as a priming agent in enhancing mutachromosomal effect.

Serum lipid levels are known to be under polygenic control and it has been demonstrated that the oil diet, in combination with other factors, enhances expression of lipid-linked abnormalities. The mutachromosomal effect of dietary oils is apparently negligible but continuous oil feeding may aggravate the action of environmental pollutants, conclude the researchers.

Smt Gajra was awarded Ph.D. degree of the University of Calcutta (1980). Dr Gajra also received Shakuntala Amir Chand Award, for 1982, of Indian Council of Medical Research.

The research scheme comprised two projects, one lasting from July 1976 to June 1979 and the other from November 1979 to November 1982. □

PERSONNEL NEWS

Appointments/Promotions

At Central Electrochemical Research Institute, Karaikudi, Smt. Lalitha Balasubramanian has been promoted, on assessment, as Scientist A (9 Nov. 1980). □

Retirements

SHRI A.K. DUTTA

Shri A.K. Dutta, Scientist EII, Central Fuel Research Institute (CFRI), Dhanbad, retired on 31 December 1982.

Shri Dutta was head of CFRI's coal survey laboratory at Ranchi. Among the principal areas of his work are the integrated survey of energy requirements of the ESCAP Region, and resource quality assessment of coals from various coalfields. As CFRI's representative in the Coal Assessment Committee, he developed a standard procedure for the estimation and categorization of coal resources of the country. Shri Dutta discovered evidence for the existence of life in the Vindhyan period, and also found a new coal seam between the Sayal and Saunda seam in South Karanpura coalfield, named Upper Sayal.

Of the many honours and awards he has received, mention may be made of the coveted Dr J. Coggin Brown gold medal for geological sciences for 1979-80 of the Mining, Geological and Metallurgical Institute of India. He has to his credit some 20 scientific papers, several technical reports, and five books. □

Scientist-Visitors to RRL-Trivandrum

Dr J.A. MAGA, Professor, Food Science and Nutrition, Colorado State University, USA, visited Regional Research Laboratory (RRL), Trivandrum, during 3-6 January 1983.

Prof. W. KEMPF, Director, Institute of Starch and Potato Technology, Federal Research Institute for Grain and Potato Processing, Detmold, FRG, visited the Trivandrum laboratory during 14-17 February 1983.

Dr Maga's visit was under the NSF-CSIR Exchange Programme and Prof. Kempf's under the CSIR-German Academic Exchange Service Programme. □

फार्म 4/FORM IV

[नियम 8 देखिए/(*See* Rule 8)]

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मैं,————————, एतद्द्वारा घोषित करता हूं कि मेरी अधिकतम जानकारी एवं विश्वास के अनुसार ऊपर दिए गए विवरण सत्य हैं।

I, Y.R. Chadha hereby declare that the particulars given above are true to the best of my knowledge and belief.

ता०/Dated 15 March 1983

Sd/-Y.R. Chadha

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Beacon Satellite Studies of the Earth's Environment

INTERNATIONAL SYMPOSIUM AT NPL

The potential of satellites in the exploration of upper atmosphere came to be realized back in 1957 when the first artificial satellite was launched. The beacon satellites provide transmissions at frequencies high enough to penetrate the ionosphere yet sufficiently low to be affected by it. Signals received on ground from these satellites exhibit Faraday fadings, Doppler shift, and scintillations. The expanding applications of beacon satellites are therefore receiving increasing attention by space scientists. The title symposium held at National Physical Laboratory (NPL), New Delhi, on 7-11 February 1983 brought together scientists engaged in studies of the environment of the earth or in planetary, interplanetary, solar, solar-terrestrial and radio astronomical studies to review the latest applications of radio beacons to the solution of many scientific and engineering problems.

Over 100 delegates, including 40 young scientists and engineers from developing countries, participated in the symposium. Some 16 invited talks, 5 special IGY lectures and 80 contributory papers were presented and discussed at nine sessions devoted to: 25 years of satellite beacon studies; Ionospheric modelling; Equatorial scintillation studies; Scintillation studies; Total electron content; Electron content effects at low- and mid-latitudes; Electron content correlations and morphology; High-latitude ionospheric effects; and Future of satellite beacon studies. Because of their growing importance, beacon studies to be pursued in future constituted the topic of a special panel session.

In the session devoted to '25 Years of Satellite Beacon Studies', the beacon investigations over USA, Europe, Australia, Japan, China, and India were reviewed. Ionospheric modelling based on the morphological study of the electron content and scintillations, as well as current efforts to improve the computer-based models, received particular attention. The results on equatorial scintillations were presented from American, African and Indian sectors. A chain of scintillation stations around 80°E long., covering latitudes from 0 to 50°N, was suggested for the Indian subcontinent. This task is expected to be undertaken under a collaborative programme between India and USA, as well as between India and USSR.

Interesting results were reported on travelling ionospheric disturbances. The symposium felt a great need for the study of gravity waves in low latitudes from observations of medium-scale travelling ionospheric disturbances. NPL is planning to record beacon satellite transmissions through a three-station network around Hyderabad. This work is expected to fructify through collaboration with US and Indian universities.

The symposium was inaugurated by Dr A.R. Verma, former Director of NPL, and now Jawaharlal Nehru Fellow.

Workshop on Beacon Techniques and Applications

Preceding the symposium was the title workshop, held 3-4 February, whose main aim was to disseminate knowledge on radio beacon techniques to younger scientists and engineers from developing countries. The subjects dealt with in the workshop included: Radio beacon techniques for investigating the ionized media in earth's environments; Propagation errors affecting modern radio systems; Instrumentation for radio beacon observations; Data-handling and evaluation techniques; Modelling techniques; Scintillation analysis techniques; and Travelling ionospheric disturbances.

Some 12 lectures covering the above subjects were delivered by experts from different parts of the world.

The symposium and workshop were sponsored, besides NPL, by URSI (International Union of Radio Science), Indian National Science Academy, Committee on Science and Technology in Developing Countries, Department of Science and Technology, Indian Space Research Organisation, and Commonwealth Science Council. □

CECRI's new corrosion research laboratory

The newly constructed corrosion research building of Central Electrochemical Research Institute (CECRI), Karaikudi, was declared open by Dr G.S. Sidhu, Secretary to the Government of India and Director General, CSIR, at a function held on 24 February 1983 at the institute's

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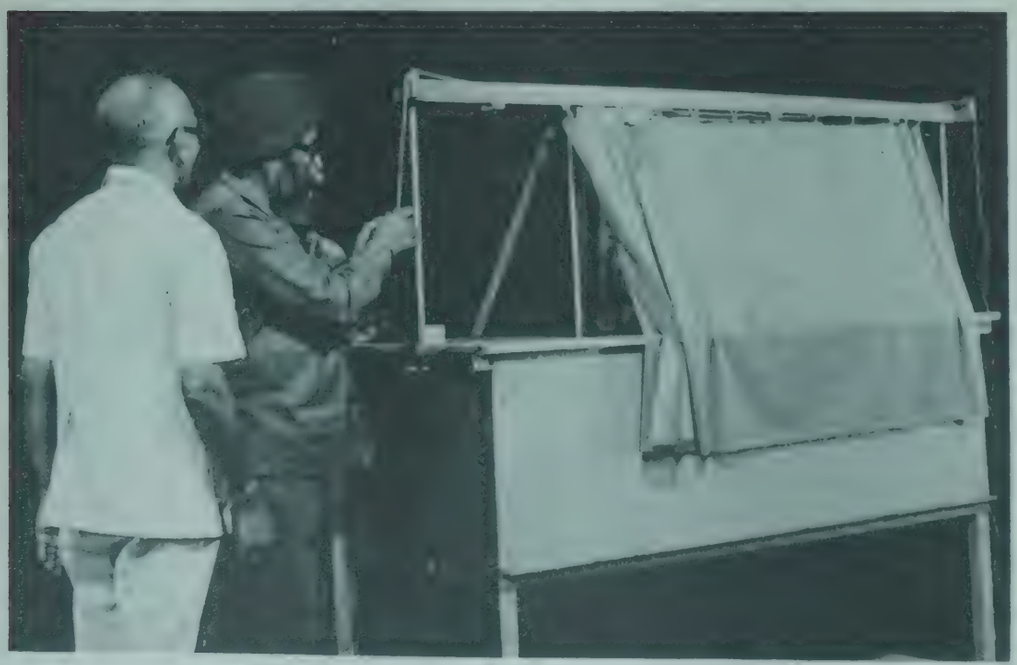
premises. Dr I.B. Gulati, Director, Indian Institute of Petroleum (IIP), Dehra Dun, and chairman of the coordination council for chemical sciences group, presided over the function. This building brings under one roof all the investigations on corrosion and its control and other related research facilities.

In his welcome address, Dr K.S. Rajagopalan, CECRI's Director, briefly outlined the progress made in corrosion research by the institute. He also spoke of the growing importance of this field in the light of the present global phenomena of depletion of nonrenewable sources and the need to conserve them by adopting measures, among which corrosion prevention plays a leading role. The institute had been providing wide-ranging services to industry on corrosion control through consultancies, sponsored schemes, and development of new products and processes. Dissemination of information on corrosion control through training programmes and the publication of 'Corrosion Bulletin' were also part of the activities in this field, he added.

Dr Gulati, in his address, said that the addition of this new block and related facilities was another important landmark in the growth of this premier institute, which had a number of achievements to its credit. Referring to the petroleum industry, he said that every barrel conserved was equivalent to an additional barrel produced, and that the cost of devizing and putting through the means to conserve a barrel by efficient use was much less than the cost of finding and producing an additional barrel of oil. All investments in corrosion control through R&D, and in implementing corrosion prevention measures, would pay back well, he added.

Complimenting the CECRI scientists on their work, Dr Sidhu said that this laboratory's contributions, acknowledged well as they were, had immensely benefited the country. He expressed the hope that many more contributions would flow. He shared some thoughts on the cultivation of an attitude of self-criticism. "Within our own system, we should make all efforts to find out what are our shortcomings and how to remedy them." On the release of processes to industry, he said that the success of a process depended first on the soundness of the process; second, on the skill of the entrepreneur; and third, on the engineering inputs in that process. But any of the failures which might be due to any one else's part was also ascribed to the know-how, he said. Therefore, it was necessary to examine the processes very thoroughly, point out the weakness to the industry or the engineering company, and define not only the laboratory's responsibilities and duties but industry's responsibilities and duties as well. Only then should the process be released for exploitation, he made it clear. He also emphasized the importance of basic research stating that one cannot do industrial research without basic research. He said every project was part of a programme of the institute funded by the government and other agencies. "We are really involved in the selection and in running the project and are part of the project and not owners of the project, and, therefore, this attitude has to be developed," he emphasized.

The Director General also released the proceedings of the symposium on 'Advances in Corrosion Control' held in November 1982 [see *CN*, 33 (1983), 20]. He also declared open the silver jubilee park of the institute. □



Dr G.S. Sidhu, Director General of CSIR, declaring open CECRI's new corrosion research laboratory's building

Science for Productivity

CSIR EXHIBITION AT PARLIAMENT

For the benefit of the members of parliament, CSIR had put up an exhibition at the Parliament Annexe, New Delhi, from 23 February to 1 March 1983. Organized by the Science Forum in Parliament and arranged by CSIR's Public Relations Unit, the exhibition had the theme 'Science for Productivity' and depicted the achievements of CSIR laboratories in the development of national economy through about 200 panels, charts, and models.

Ranging from highly sophisticated technologies for industrial and defence needs to the pre- and post-harvest

Shri Buta Singh inaugurating the exhibition. To his left is CSIR's Vice President Prof. S. Nurul Hasan. Those who visited the exhibition, but not seen in photograph, included Shri Vasant Sathe, Minister for Chemicals and Fertilizers, and president of the Science Forum in Parliament; Shri Shivraj V. Patil, Minister for Science & Technology; Smt. Najma Heptullah, M.P., and secretary of the Forum.

technologies meant for villages, the exhibits related to colour TV sets, laser and optical glass, polymetallic nodules, large-scale integrated circuits, instrumentation for key industries, low-cost housing, cryo technique for cancer removal, new metallurgical processes, new pesticides, and protein-rich food from domestic sewage. Leather exhibits demonstrating new dyeing and printing techniques and new varieties of protein-rich foods and beverages, which are already in the market, were some of the other attractions.

Opened by Shri Buta Singh, Union Minister for Parliamentary Affairs, Works & Housing, and Sports, the exhibition drew a large number of central ministers and parliamentarians. □

Electrochemical method for guaiacol acetate

A simple electrochemical method for the preparation of guaiacol acetate from anisole has been worked out by Central Electrochemical Research Institute (CECRI), Karaikudi. Guaiacol is an organic chemical used in the manufacture of vanillin, which is widely used as a flavouring agent. The country's demand for guaiacol is estimated at 100 tonnes per annum.

In the CECRI process, anisole is oxidized at graphite anodes in a bath containing glacial acetic acid and sodium acetate. At the end of the electrolysis the reaction mixture is steam-distilled to collect the mixture of guaiacol acetate and smaller amounts of *p*-acetoxyanisole, which byproduct has its use in the manufacture of quinols.

Guaiacol acetate is normally prepared by a chemical method which involves multi-stage synthesis and laborious purification steps, as a result of which yields are very poor.

The process was developed under a project sponsored by Bush Boake Allen India Limited, Madras. □

Auto Bas

A digital instrument for measuring the electrical resistance of battery separators and porous diaphragms—designed and developed by Central Electronics Engineering Research Institute's (Pilani) extension centre at Madras—is available for commercial production. Named Auto Bas, the instrument can be used for efficient quality control of separators during production and also for evaluation of the separators during fabrication of batteries. Instruments which are currently used by battery industries for measuring the electrical resistance of separators are not of the direct-reading type unlike the CEERI device.

The instrument comprises a four-electrode cell, a stable oscillator, voltage-to-current converter, instrumentation amplifier, a thickness adjustment circuit, and a digital panel meter. The cell contains two baffles with holes of 9 cm diam. each filled with sulphuric acid to an optimum level. While taking measurements, the separator is inserted between the baffles. The output from the cell is fed to an instrumentation amplifier with adjustable gain. As the separator resistance varies with its thickness a correction to the measured value is made with the thickness adjustment circuitry. The final output is displayed in terms of ohms cm^2/mm thickness on a digital panel meter with an accuracy of ± 0.01 ohm cm^2/mm.

The instrument has a specific resistance range of up to 1 ohm cm^2/mm thickness, the maximum thickness of the separators being 1 mm. A four-electrode system with ac excitation acts as sensor.

Designed and developed by CEERI's extension centre at Madras, this instrument, named Auto Bas, measures the electrical resistance of battery separators and porous diaphragms. Its advantage is that, unlike the instruments currently used by battery manufacturers, it is a direct-reading type. Is available for commercial production

The instrument has a display of 2½ digits.

A unit capable of producing 50 pieces of the instrument is estimated to be economically viable. Such a unit would require a fixed capital of about Rs 36,000 and a working capital of about Rs 69,000; the cost of production works out to be about Rs 4800, the return on investment being 33%.

The terms and conditions for acquiring the know-how are: lump sum premium, Rs 10,000; royalty, nil; and nature of licence, non-exclusive.

The know-how for the instrument has been assigned to National Research Development Corporation of India, New Delhi, from whom further details may be obtained. □

Cultivation of *Enteromorpha*

Techniques for the cultivation of an economically important green seaweed, *Enteromorpha*, have been developed by Central Salt & Marine Chemicals Research Institute (CSMCRI), Bhavnagar. This algal seaweed can be cultivated in intertidal belts of the coast as well as in artificial ponds on land.

The plants are cultivated on nets in the intertidal belt of the coast. A biomass of 920-1718g fresh weight per square metre area of the net was obtained in 6-8 weeks during winter season. In this method the plants are not given any fertilizer treatment. Three crops can be harvested in a year. One hectare of the coast can produce 1.9 tonnes of dry alga a year.

In the second method the plants are cultivated on-land on nylon threads maintained in artificial ponds. A biomass of 916-1226 g, sometimes up to 1775 g, per square metre area of the pond was obtained in 5-6 weeks' growth period. Here, the plants are given a fertilizer treatment, proper light and temperature conditions being maintained. Six to seven crops can be obtained in a year. One hectare of pond can produce 8.6 tonnes of dry alga a year.

The *Enteromorpha* spp are used as food. The institute has also isolated a bioactive substance which is active against *Mycobacterium tuberculosis*—a TB-causing bacterium. □

Net laden with 4-week-old Enteromorpha plants. CSMCRI has perfected the technique of cultivating this algal seaweed, a food material as also a source of bioactive substances.

Special surface effects on finished leather through a novel method

NRDC's AWARD-WINNING INVENTION

The announcement of the National Research Development Corporation of India's Republic Day Awards (1983) to a team of five scientists from Central Leather Research Institute (CLRI), Madras, for their invention of a method of producing special surface effects on finished leather has already been made

[*CN*, 33 (1983), 17]. Given below is the process description:

The method

The method produces a distinctly visible grain effect on finished leathers. The raising of the depression as well as the shrunken effect on the grain side of the finished leather produced by chemical means makes the leather attractive. The process is very simple and the chemicals used are cheap and indigenously available. A weak base and a weak organic acid are the only chemicals required. The technique is ideally suited for semi-chrome grain garment, suede leathers and also vegetable-tanned leathers. The thickness of leathers should preferably be between 0.7 and 0.9 mm.

Experiments on various leathers have shown that sheep nappa leather has a pronounced grain effect because of the softness of the skin. Next comes the goat skin.

As for tannage, vegetable-tanned leathers and skins are easy to process. Because skins are tanned nowadays either by a semi-chrome or a full-chrome process, these skins have been experimented upon. The advantage with vegetable-tanned skins is that they absorb the chemicals readily. So also with semi-chrome.

The chemical is applied on the flesh side of the leather either with a brush or an ink-filler along predetermined lines or design. If a random effect is desired, the application can be done without any lines, by a mere sprinkling. On the application of the chemical compound the phenomenon of shrinking starts and surface effects are predominantly seen; while drying, the whole process is complete.

After the application of the chemical on the entire surface of the leather, the skin is allowed to dry for a few minutes and the skin is slightly hand-boarded to remove the dried-up chemicals on the flesh side. The leather is not stretched immediately, stretching being done later. Some of the examples of grain

effect produced are popcorn effect, quilted design, and pebble design.

On a commercial scale, the printing, i.e. application of the chemical, could be done by making wooden blocks. Block printing, as practised on textiles, could be done on leather. For this, a stamp pad is prepared and this is soaked with the chemical composition. The wooden block with necessary design, soaked with the chemical, is stamped on the flesh side of the skin and in a short time the application is done.

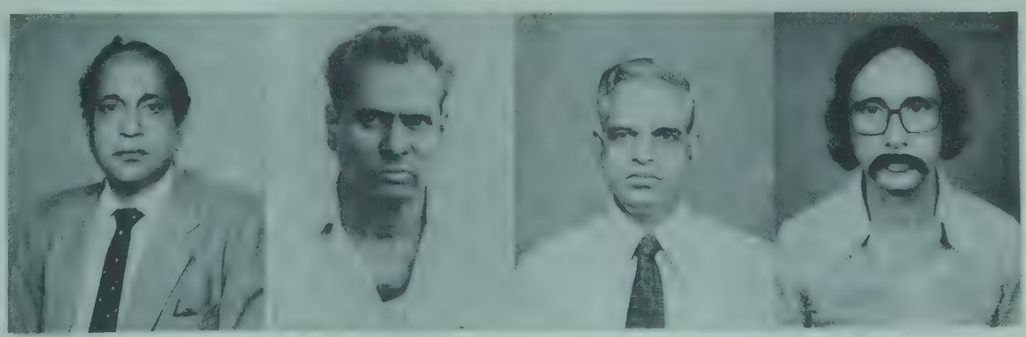
Screen printing, because of the liquid nature of the chemical, has not been successful; it is not possible to prepare the chemical in a paste form.

Articles made of leather with popcorn effect: handbag (above) and garment (left).

Advantages

The method has several advantages:

- Finished leathers of poorer quality, which are generally down-graded, can be upgraded by masking the defects through the technique.
- Novelty and fashionable leather goods, especially lady's handbags and garments made from such leathers, are more attractive than goods made out of conventional leathers.
- No sophisticated technology or machinery is involved. It is simple hand-sprinkling or block-printing through equally simple devices.
- Leather goods like lady's handbag, leather garments and lady's sandals made with this leather have been found good in use.
- The physical properties of leather, such as tensile strength and stitch tear strength, are in no way impaired.
- Small and cottage-scale tanners can make these leathers without any additional investment on machines.



The awardwinners (from left): Shri T.K. Parthasarathi, Shri M. Chockalingam, Shri K. Radhakrishnan and Shri S. Natesan

Brief profiles of inventors:

Shri M. Chockalingam

Presently Foreman at CLRI, Shri Chockalingam had earlier worked in many firms as designer and production supervisor. With his rich experience in designing and fabricating a wide variety of leather goods, he has developed many new processes independently—products from plant parts, 'Leather-Tex', and molded articles. Has specialized in taxidermy and processing of certain types of leathers, and in making colourful leather flowers, leather garlands, and leather bouquets.

Shri S. Natesan

A graduate in chemistry of Madras University, Shri Natesan has been with CLRI for over 20 years. With considerable experience in leather-goods manufacturing and being conversant with modern production techniques, he has developed many newer products using new types of leathers. Presently engaged in developing novelty products using scrap leathers to help rural and small-scale industries. Was associated in the development of products from plants, 'Leather-Tex', and other such products.

Shri K. Radhakrishnan

Shri Radhakrishnan, a B.Sc., B.Sc. (Tech.) and A.M.I.I. Chem. E., has had 25 years' R&D experience. Has specialized in leather boards and goods and holds a patent on the utilization of chrome leather shaving in the manufacture of leather boards. An honorary consultant to the West Bengal State Leather Industries Corporation, he is also on the panel of UNIDO experts on leather goods, and has assisted Indian Standards Institution in tendering advice in the field of his specialization. He received training in Yugoslavia.

Shri T.K. Parthasarathi

Divisional head of CLRI's Leather Goods Area since 1973, Shri Parthasarathi holds a degree in chemistry and a postgraduate degree in leather technology from Madras University. With CLRI since 1954, he has been associated with developmental activities in leather goods. Deputed under UNEPTA fellowship, he received training in leather-goods manufacture in UK in 1969. He was project leader of the leather-goods project started with UNDP assistance in 1973. He has visited a large number of leather-goods manufacturing units in Europe and USA. He has to his credit nine technical papers. Along with his coworkers he has been developing newer designs in leather goods to help the small-scale industry. He also teaches students in leather-goods manufacture. □

PROGRESS REPORTS

NML Annual Report : 1980-81

The annual report of National Metallurgical Laboratory (NML), Jamshedpur, for 1980-81, brought out recently, shows that the multidisciplinary activities of the laboratory yielded rich dividends through sponsored projects, consultancy assignments, and technology transfers. An important project awarded to the laboratory, along with the British Steel Corporation (Overseas Service), was concerned with the modernization of the Durgapur Steel Plant. In connection with this project, beneficiation studies were carried out on over 100 tonnes of run-of-mine ore sample from Bolani Ore Ltd and the report was submitted to the sponsor—Steel Authority of India Ltd.

The laboratory carried out bench- and large-scale sulphur beneficiation studies on low-grade pyrite-pyrrhotite deposits of Saladipura with a view to manufacturing sulphuric acid. A concentrate assaying to about 40% sulphur with 90% sulphur recovery could be obtained from the sample.

Beneficiation and agglomeration studies were completed on a pilot-plant scale on two low-grade Syrian iron ore samples, obtained through Metallurgical and Engineering Consultants India Ltd (MECON). These studies formed the basis for MECON's feasibility report on the establishment of the proposed iron and steel complex in Syria.

Encouraged by the good performance of NML-PM2 alloy conductors in coastal regions in trials conducted by Gujarat State Electricity Board (GSEB), a conference of several state electricity boards has recommended wider trials with a composite AAC-NML-PM2 and PM215 conductor in coastal regions. GSEB has also shown interest in the use of NML-PM53, a medium-strength medium-conducting aluminium-alloy conductor, in coastal regions.

The PM401 aluminium-alloy-bearing bushes developed by NML as a substitute for the bronze-bearing bushes were evaluated by Research Design and Standards Organisation (RDSO), Lucknow, for steam locomotives; their performance was found to be satisfactory. NML has sent large-diameter bushes to RDSO for further trials. This railways organization has also shown interest in NML PM215 for use as catenary conductor in the railway electrification project.

The laboratory established production technology for an aluminium alloy filler wire (designated NML PM 16) corresponding to the relevant to BS and IS specifications. Large quantities of the filler wire in different gauges were supplied to Hindustan Aeronautics Ltd, Bangalore, for evaluation.

The reactive filter which NML has developed is being commercially produced by Bhaskar Stoneware Pipes (P) Ltd. The firm has increased the production to meet the increasing demand. The user industries have reported reduction in sodium and oxide levels, uniformity of grain size, improvement in the yield in casting and extrusion shops, and reduction in the quality of fluxes used. A UK firm is also negotiating through National Research Development Corporation of India the taking up of the know-how.

The laboratory rendered its expertise and consultancy to minimize rejection rate in the manufacture of aluminium utensils by small-scale industries in

Bihar. This has resulted in lowering the rejection rate from 30-35% to 5-7%.

Under a collaborative project with Visvesvaraya Iron & Steel Ltd on process standardization of high-strength low-alloy steels, the laboratory made industrial-scale heats of niobium and niobium-vanadium steels in a 12-tonne LD converter. These steels find use in the construction of ships, bridges, buildings, pressure vessels, transmission towers, etc:, and their demand is being met partially through imports.

The laboratory has taken up a package assignment to set up a ferro-tungsten pilot plant (1 tonne/day) based on alumino-thermic reaction for the Central Research Organisation, Rangoon. This assignment is under the Indian Technical and Economic Cooperation Programme.

NML's technique of assessing the extent of accumulation of creep damage through accelerated stress rupture tests was being utilized for predicting the state of the condition of tubes from Central Electricity Board (for Badarpur Thermal Power Station) and Neyveli Lignite Corporation's thermal power plant. Also, the laboratory's expertise on the causes of failure of engineering metal components in construction materials was in great demand by thermal and hydroelectric power plants, oil refineries, petrochemical complexes, etc. The technology for aluminium base 'Superal' anode useful in cathodic protection of ships and harbour structures was released to Aluminium Manufacturing Co., Calcutta; the firm started production.

The NML Pyroloy-1000—a heat-resistant cast iron—was used for making finger castings as substitutes for nickel-chrome finger castings. Put to use by Indian Iron & Steel Co's Stanton Pipe Foundry in Ujjain, the castings proved to be superior to nickel-chrome castings.

Thirty-nine research investigations were completed and reports prepared. Three patents were filed. □

CSIO Annual Report: 1981-82

The major achievements of Central Scientific Instruments Organisation (CSIO), Chandigarh, during 1981-82, according to its annual report for that period published recently, include the development of an integrated digital temperature indicator; a digital pressure indicator; an electronic system for measuring, monitoring and controlling the flow of liquids in pharmaceutical plants; a data acquisition and logging system for sugar industry: a non-fade ECG monitor; an echocardioscope; laser and holographic optical techniques; an electromagnetic flowmeter; and a sampling gun.

The integrated digital temperature indicator designed, developed and fabricated is based on EPROM and binary rate multiplier. It can be used with any one of the six widely used thermocouples, through a front-panel rotary switch. Covering the temperature range -100° to $+1760^\circ$C, the indicator has an accuracy of 0.25% fsd $\pm$ 1 digit and a resolution of $\pm 1^\circ$C. Automatic ambient temperature compensation is also provided.

The digital pressure indicator designed and developed uses linear voltage differential transformers as sensors for different pressure ranges—160, 200, 400, and 1600 kg/m^2. The laboratory developed bread-board model of a microprocessor-based multipoint temperature scanning system to accommodate seven thermocouples and a 100 ohm RTD. The system is programmable, linearization being done through the computation of an algorithm.

An electronic system based on integrated circuits was developed for measuring, monitoring and controlling the flow of liquid through eight fermentors in a pharmaceutical plant (of Pfizer Ltd, Chandigarh), under a sponsored project.

Work taken up on the development of a microprocessor-based integrated process control system for sugar industry consists of two phases. The first phase covers monitoring and logging aspects of juice heaters, evaporators, sulphiters, etc., and the second, the control aspects. Under an agreement CSIO is rendering consultancy to Punjab Khand Udyog Ltd, Chandigarh, for modernizing their sugar factories at Gurdaspur and Zira. At the request of Vellore Cooperative Sugar Factory in Tamil Nadu, CSIO is modernizing their factory also. A microprocessor-based 7-channel data acquisition and logging system was designed, developed and successfully tried in sugar factories at Gurdaspur and Vellore.

A universal pulse generator (25 MHz) was developed which not only provides control on all pulse parameters but also generates digital sequences to a limited degree and signals of different wave shapes. It is a multi-function test instrument.

In continuation of the know-how of a mains-operated digital grain moisture meter released earlier to Associated Instruments Manufacturers (I) Pvt Ltd, New Delhi, for commercial exploitation, the laboratory developed an improved, battery-operated version of the meter at the firm's request. Built around CMOS technology, the improved model displays the moisture percentage of a grain through a 3-digit liquid crystal display with an accuracy of 0.2% $\pm$ 1 digit.

A Vasec apparatus developed by the laboratory underwent successful trials at Postgraduate Institute of Medical Education and Research, Chandigarh. The instrument provides bipolar electrocoagulation of vas deferns lumen to achieve quick healing of the vas with a minimum of trauma, scar tissue and sperm antibody formation. It provides effective sterilization of the male while maintaining the best possible conditions for reversal.

Other medical instruments designed and developed include: a non-fade ECG monitor (two models), an echocardioscope, and a colorimeter for analysis of blood for glucose, albumin, urea, bilirubin, and total protein.

Significant achievements in optics relate to the design and development of an automatic slide projector spectrocolorimeter, new optics for bubble chamber scanner, an optical system for Brinell hardness testing machine, naval projectors (25 units) for an ARL plotting table, profile projector objectives, and fixed-focus objectives. The optical system for Brinell hardness testing machine was designed, developed and fabricated under a consultancy agreement with an instruments firm in Maharashtra. Another consultancy assignment completed was on establishing the manufacture of reticles of varied specifications, for Montech Instruments, Chandigarh.

The laboratory fabricated holocylindrical lenses on conventional recording media. Successful trials of holographic recording on dichromated gelatins and photoresists were achieved. Other important pieces of work relate to experimental bench set-up of a He-Ne laser power meter, recording of rainbow and 180° field composite holograms, realization of laser communication kit for educational purposes, and development of a novel holographic Moire method for testing thin plates.

A laboratory prototype of a metal spectroscope was developed. Essentially a three-prism spectroscope along with an ac arc generator, it is a quick, reliable nondestructive and economical instrument for spectrochemical analysis of ferrous and non-ferrous metals and their alloys.

Fully engineered electromagnetic flowmeters, along with associated electronic signal conditioners, were developed for 12.5, 25, 50, 100 and 150 mm diam. flow pipes. Design drawings for flowmeters with 200 and 300 mm diam. flow pipes were completed. An oxygen analyzer along with its sampling unit which CSIO has developed gives a continuous measurement of the percentage of gaseous oxygen.

A digital linear displacement transducer with a resolution of 0.005 mm was developed. It gives continuously, through digital display, the tool and slide positions even when machining is in progress, thus eliminating the need for conventional measuring instruments like vernier callipers and micrometers. A fibre-optic clinical headlamp was designed and developed. It is used by surgeons for illuminating body parts under observation. The design and development of a sampling gun, a simple and handy device for quick extraction of metal samples for analysis, was completed.

CSIO continued to assist industry, educational institutions, and government establishments by providing testing, calibration, and repair and maintenance services. □

PERSONNEL NEWS

PROF. A. RAHMAN

Prof. A. Rahman, Director, National Institute of Science, Technology and Development Studies, New Delhi, has been re-employed for a period of two years from the date of his superannuation, i.e. 28 February 1983.

Honours & Awards

RRL-Hyderabad scientists bag two IPA Awards for 1982

For their work on water-soluble epoxy vehicles Dr N. Krishnamurti, Dr M.M. Shirsalkar and Dr M.A. Sivasamban of Regional Research Laboratory (RRL), Hyderabad, have won the Indian Paint Association's first prize of Rs 5000, and a citation, for 1982. Their research paper on the subject appears in *Journal of Oil Colour Chemists' Association*, **65**(8) (1982), 301.

The paper describes the development of water-soluble epoxy vehicles which have been employed to produce paints with good gloss and very efficient anticorrosive properties. These paints can serve as economical, single-coat systems, having the combined properties of primers as well as of top coats, when applied by brush, spray and dip-coating methods. Two such water-soluble epoxy vehicles are those modified with (i) dehydrated castor oil fatty acids and copolymers of styrene-methacrylic acid, and (ii) Diels-Alder adducts of dehydrated castor oil fatty acids and methacrylic acid.

Also, Dr M. Yaseen and Shri K.V.S.N. Raju of the same laboratory have won the IPA's second prize comprising a cash of Rs 3000 and a citation for their work on paint coatings. Their research paper titled 'A study of the merits of individual tests and their correlations in assessing the performance of paint coatings' has been communicated for publication in the journal.

The authors selected for tests 22 paint systems mostly based on commonly used commercial products so that the information obtained is of practical interest to the paint industry. Ten different types of tests were conducted for assessing the exterior durability of coatings following identical schedules of air-drying and outdoor weathering. The findings indicate that tests conducted on coatings air-dried for short periods do not provide sufficient information in assessing the performance. The assessment of exterior durability should be made by conducting the tests at intervals on coatings weathered at least for a period of six months, say the authors. □

CSIR Society

Shri Shivraj V. Patil, Union Minister of State for Science and Technology, Electronics and Ocean Development, has been nominated member of the Society of Council of Scientific & Industrial Research, till 5 June 1984. □

INSDOC shifts to its new premises

The Indian National Scientific Documentation Centre (INSDOC) has shifted from Hillside Road, New Delhi 110012 to its new buildings at 14, Satsang Vihar Marg, off S.J.S. Sansanwal Marg, Special Institutional Area (South of IIT-Delhi), New Delhi 110067. (Tel. 665837). □

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Role of Fundamental Research in Developing Countries

This was the topic of an international seminar which National Institute of Science, Technology and Development Studies (NISTADS), New Delhi, had organized in New Delhi from 7 to 10 February 1983.

Serving as a backdrop to the deliberations was the Prime Minister Smt Indira Gandhi's message to the participants in which she reminded them that self-reliance is important for all countries, especially for a country of India's size whose problems are too vast to be solved by outside aid, either economic or intellectual. In the later part of the message she drove home the need for fundamental research when she said that facilities for advanced and sophisticated work must be created to help keep the best young men and women in the country.

Inaugurating the seminar, Shri L.K. Jha, Chairman of the Economic Administrative Reforms Commission, described the potentialities scientific knowledge can create for material development. Stating that fundamental research and applied research are expressions of the Promethean spirit, the speaker emphasized that developing countries cannot afford to neglect fundamental research. Closer links between fundamental research and national goals should be established. Once the objectives of fundamental research had been clearly perceived, priorities had to be determined in regard to the fields in which research would be conducted, added Shri Jha.

Prof. S. Nurul Hasan, in his address, highlighted the urgency to find ways to bridge the widening scientific and technological gap between the developing and developed worlds. For this purpose, he suggested that the growth of indigenous traditions in basic sciences should be encouraged. Also, new branches of knowledge had to be developed not only to catch up with the developed world but to move forward wherever it was possible. Training and research in basic sciences could help us tremendously to keep our minds open and in such a fertile soil, technology could grow, concluded the CSIR Vice President.

Delivering the presidential address, Shri Shivraj V. Patil, Minister of State for Science and Technology, Electronics, Space, and Atomic Energy, drew the attention of the participants to the need for strengthening fundamental research in developing countries. Basic research formed the first step in the long innovation chain of products and processes in industry and agriculture. Modern technology was increasingly becoming highly dependent on the

Shri Shivraj V. Patil delivering the presidential address. Others seated on the dais (from right) are: Dr Ibrahim Badran (President, Egyptian Academy of Science and Technology), Prof. M.G.K. Menon, Prof. S. Nurul Hasan, Shri L.K. Jha, Prof. Janos Szenthagothai (President, Hungarian Academy of Sciences), and Prof. A. Rahman.

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discovery through basic research. During the past two or three decades, several frontier technologies, such as microelectronics, biotechnology, space technology, nuclear technologies, and ocean technology had appeared on the scene which could solve the socio-economic problems of the developing countries, added the science minister.

In his keynote address, Prof. M.G.K. Menon, Member of Planning Commission, called for a need-based approach on the issue of basic research. The choice, he said, was between buying technology from supermarkets of the world or going in for research 'that would be linked to our specific problems and needs'. In the area of health, for instance communicable diseases, he suggested going in for drugs that would be based on research within the country rather than for something alien.

Prof. Menon decried the tendency among the people to indiscriminately dump fundamental research and science and technology in the same basket when, in reality, fundamental research accounted for only a small fraction of the total S&T budget. Conducted in the right manner, basic research would be far from expensive, according to Prof. Menon.

Prof. A. Rahman, Director of NISTADS, in his welcome address, highlighted the pervasive influence of fundamental research which had led to technological supremacy of the developed countries over the developing world. He stressed that the myth of fundamental research being a luxury should be exploded. It, in fact, is an integral part of the process of development, he added.

The deliberations of the seminar, in which some 30 delegates from 18 countries took part, spanned six sessions: (i) Objectives and Role of Fundamental Research; (ii) Growth and Impact of Fundamental Research; (iii) Priorities in Fundamental Research; (iv) Institutional Systems of Financing Fundamental Research; (v) Education, Training and Manpower Development; and (vi) International Cooperation. The conceptual definitions of fundamental research were discussed at three levels. Some of the more salient features of the deliberations and recommendations:

First, fundamental research can be located between basic and applied research. External aims and special purposes which can work as orientation for planned research have not yet been established. Second, from the viewpoint of scientific process as a system of social action, fundamental and applied research should be seen as a sequence of different action types. Third, fundamental research is bound to benefit some one some day. The questions Who will benefit? How? How much and when? must be part of the internal process of evaluation and reflection. Fundamental research has a very wide range of possible utility, covering different fields of social action and consequently innumerable side effects. To prevent the undesirable effects of fundamental research on society, adequate popularization of science and public debate were considered essential.

The recognition of the practical role of fundamental research to identify its appropriate dimensions is a crucial task for all the developing countries whose resources are limited. It has to play a significant role in the improvement of traditional technologies and strategic development of science and technology. It transcends national boundaries and provides quantum jumps to the emerging nations. Case histories were discussed to show how basic research had led to applications in industry.

Fundamental research performs not only cognitive and economic functions, but also social functions. It is a component of culture and can be compared with the pleasure and prestige which creative art provides to society. It contributes to the stock of human knowledge and adds to the prestige and honour of a country where fundamental discoveries are made. While formulating the objectives of science policies, it is necessary to emphasize the indirect influence of fundamental research in meeting the intellectual needs of the society. This is a necessary condition for promoting research in universities.

Certain paradigms were suggested in formulating the policy for fundamental research in developing countries. These are: rapid growth in the expenditure and research personnel in the third world, increasing cost and sophistication of instrumentation, decreasing cost and increasing effectiveness of communications technology, and emergence of frontier technologies.

An adequate financing system for fundamental research is a must. The system should ensure conditions for producing scientific work which includes equipment, building, and adequate salaries. There are three types of institutions: (i) universities in which research is discipline-oriented, (ii) academic institutions which are problem-oriented, and (iii) industrial research institutions in the fields of agriculture, medicine, etc. to undertake and sponsor basic research. Their roles in fundamental research should be determined. There is a critical mass of fundamental research effort required to derive benefits from it. For supporting fundamental research a reasonable percentage of GNP should be arrived at. It is imporant to have a science policy-making body which does not see things from an administrative angle only. The selection of the members of the science policy-making body is crucial because each member should have an objective approach.

There is a strong relationship between fundamental research and economic growth. Developed nations have endogenous scientific and technological bases built up over the years. Though developing nations have gained political independence, they have to depend on exogenous sources for technology. However, India presents a unique example because she lies in both the groups of nations. The scientists of developing countries should pool their resources — both human and

financial—for doing research, whether fundamental or applied, with a spirit of cooperation. Cooperation with developed countries as well as among developing countries themselves is necessary to establish a community of scientists in developing countries to encourage free flow of scientific and technical information and to remove the relative isolation of scientists in developing countries.

At the concluding session the seminar adopted the report of the seminar some of whose recommendations have been mentioned above.

The participants appreciated the initiative taken by NISTADS in organizing the seminar and suggested that opportunities for having such dialogues between scientists from East and West, North and South, and South and South countries should be provided on a continuing basis on selected problems facing science and society. □

Small Two-Stroke Engines: Utilization of Fuels and Lubricants
WORKSHOP AT IIP

The title workshop, held at Indian Institute of Petroleum (IIP), Dehra Dun, discussed the present state of knowledge on the utilization of fuels and lubricants in small, two-stroke engines with a view to identifying areas needing more R&D efforts. Held 3-4 March 1983, the workshop had its deliberations spread over four sessions: (i) Fuel efficiency and combustion, (ii) Performance evaluation and experimental techniques, (iii) Alternative fuels, and (iv) Engine lubrication. Sixteen technical papers were presented in the sessions. A panel discussion related to topics like: Practicability of charge stratification in two-stroke engines; Improvements in scavenging and reduction in short-circuiting of charge through modification of intake and exhaust systems and devices; and Lubrication and lubricants for use in two-stroke engines.

A keynote paper was presented by Shri S. Singhal, project coordinator of IIP's engines laboratory, in which the speaker highlighted some specific improvements desired and problems encountered in efficient combustion and lubrication in small, two-stroke engines. The workshop identified three areas for further R&D work: (1) Engine fuel economy through modifications in the intake and exhaust systems; (2) Studies to achieve lean air/fuel ratio, to improve scavenging by incorporation of reed and rotating disc values, and to improve misfiring particularly at part loads; and (3) Classification and development of test methods for two-stroke engine oils. It was also recommended that manufacturers and oil companies should interact for developing two-stroke engine oils, and that users should be educated on better utilization of fuels and lubricants by oil companies, manufacturers and other agencies.

Shri K. Ramachandran, Director, Automotive Research Association of India, Pune, who inaugurated the workshop, dealt with, in his address, improvements required in thermodynamic efficiency, lubrication, vibrations, performance, emissions, and component designs. Dr I.B. Gulati, IIP's Director, spoke of the importance of the two-stroke engines in personal transportation in India.

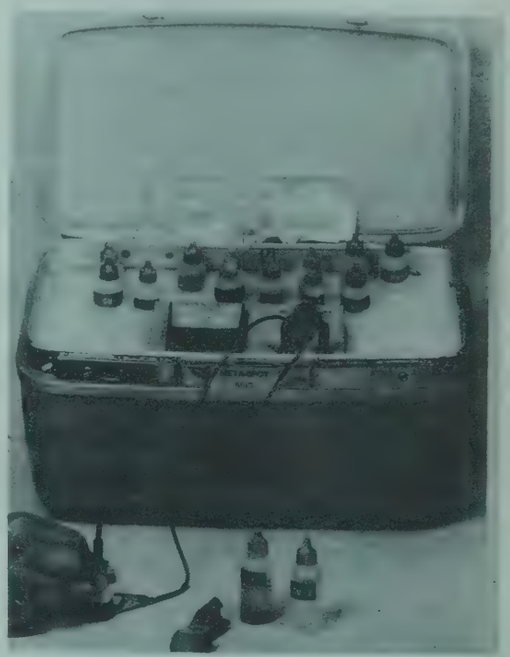
Thirty-three delegates representing engine builders, automotive ancillary industry, oil companies, additive manufacturers, and academic and R&D institutions participated in the workshop.

The institute has brought out the proceedings of the workshop, which (priced Rs 100) can be had from: The Director, Indian Institute of Petroleum, Dehra Dun 248 005. □

Electro-spot test kit for non-ferrous alloys

Following the development of a test kit for detection of alloying elements in steel [*CN*, 32 (1982), 29], Central Scientific Instruments Organisation (CSIO), Chandigarh, has succeeded in developing a similar kit for detecting alloying elements like magnesium, zinc, nickel, manganese, iron, and copper commonly present in aluminium-base alloys. Furthermore, a kit for identifying all the common elements, except tin, present in copper-base alloys has been developed.

Both the kits, when combined, would enable one to identify various types of



Electro-spot test kit for detecting alloying elements in nonferrous alloys: CSIO, Chandigarh. The principle of the kit is an inexpensive, non-destructive and quick method of qualitative and semi-quantitative analysis, much in demand by metal users as conventional methods of chemical analysis and instrumental techniques are not only costly but time-consuming. Earlier, CSIO had developed a similar kit for detection of alloying elements in steel.

aluminium- as well as copper-base alloys like brass, bronze, aluminium-bronze, manganese-bronze, nickel-silver, leaded brass, and Duralumin as also certain types of platings like chromium, copper, nickel, tin, and zinc.

These kits fulfil a long-felt need by metal users for an inexpensive, nondestructive and semi-quantitative analysis. The laboratory has already assigned the know-how of the kit for the detection of alloying elements in steel to National

Research Development Corporation of India. The know-how for complete non-ferrous identification kit is expected to be assigned to the corporation shortly. □

Vibrotone

This is a non-destructive on-line, all-electronic equipment for measuring the vacuum of sealed cans. Developed by Central Electronics Engineering Research Institute's (Pilani) extension centre at Madras, and also available for commercial production, the equipment has a distinct advantage over the piercing-type vacuum gauge (destructive method) presently used by the food-preservation and canning industry. Small-scale canning industries would greatly benefit by exploiting this invention to increase productivity as well as to maintain a uniform quality of products.

The equipment consists of a foot-operated pedal connected to a rod which on operation lifts the side plate and consequently, through a lever, the can under test. The top lid of the can comes close to the excitation coil which gets a high-voltage power supply through a spark switch, which in turn is controlled by a trigger circuit through a front-panel, manually operated switch. This way the top lid of the can gets excited and the signal produced is picked up by a sensor. The signal is conditioned digitally. The vacuum/pressure levels are displayed as L for low, and O for optimum, H for high, and E for excess, and counters giving the number of cans corresponding to each level. Two prototypes have undergone field tests successfully.

The non-destructive, on-line, all-electronic equipment—Vibrotone—for measuring the vacuum of sealed cans. Developed by CEERI's extension centre at Madras, the instrument is available for commercial production.

Specifications

Can size	: A2½
Efficiency	: 600 cans/hr
Quality of check	: on-line, non-destructive
Vacuum descrimination	: ±2 mm of Hg
Display	: digital
Accuracy	: ±2%
Power supply	: 230V, 50 Hz

The raw materials and components required for manufacturing the equipment are: brass rods, Perspex sheets, aluminium sheets, tubes and angles, mild-steel sheets, rods and angles, plywood, oil-filled high-voltage capacitors, integrated circuits (ICs), transistors, capacitors, resistors, transformer cores and coils, spark tube, ignition coil, panel meters, switches, displays, counters, etc. Except for the oil-filled high-voltage capacitors all are available indigenously.

Apart from the light workshop machines like drills and spanners the test equipment required are: function generator, PCB drilling machine, oscilloscopes (dc to 10 MHz), frequency counter (10 MHz), digital multimeter, power supplies (±12V and +5V dc), HV probe for oscilloscope (up to 15 kV), vacuum pump and gauges, and IC testers. All these are available indigenously.

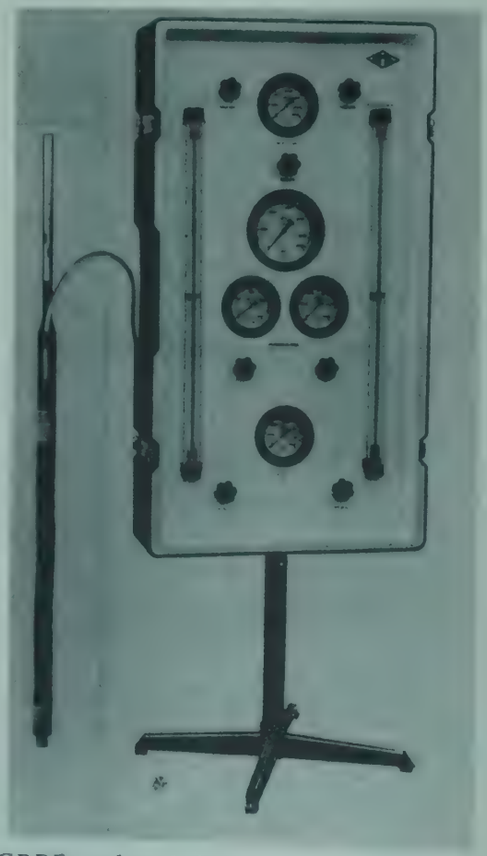
For a unit to produce 25 vibrotones per annum a fixed capital (for equipment only) of Rs 50,000 and a working capital of Rs 1,25,000 will be required, the estimated cost of production being Rs 18,000.

Tentative terms for the transfer of technology are: lump sum premium, Rs 50,000; recurring royalty, 2%; nature of licence, non-exclusive; and period of licence, 7 years.

The know-how for the equipment has been assigned to National Research Development Corporation of India, New Delhi, from whom further details may be obtained. □

Sub-soil deformeter

A device for testing the strength and deformation of soil at different depths down a borehole is ripe for commercial production. Developed by Central Building Research Institute (CBRI), Roorkee, and called sub-soil deformeter, the device is superior to the existing devices by which the soil behaviour can be evaluated only at the condition of failure. The CBRI device



CBRI's sub-soil deformeter which tests the soil properties down a borehole and enables the designing of foundations of structures. Superior to pressure meters of the French Menard type, and simpler to operate, the device was fabricated by an instruments manufacturing outfit.

can dispense with the import of pressure meters of the French Menard type.

The sub-soil deformeter was developed in collaboration with, and under sponsorship of, Associated Instruments Manufacturers (I) P. Ltd, New Delhi. The company fabricated the prototypes on the basis of the design provided by the CSIR laboratory. Tested successfully under field conditions, the design was released to the same manufacturing company for commercial production. In addition to about a dozen pieces sold in India, a few units have been exported.

Consisting of indigenous components and materials, except for the membranes, the device is simple to operate. The researcher responsible for the design of the instrument is Shri S. Venkatesan, who has patented the invention (Indian Pat. 145032: 1975). □

Major R&D projects of engineering group of laboratories

During the Sixth Plan period the major inter-laboratory R&D thrust areas of the engineering group of CSIR laboratories relate to: development of alternative/additional sources of energy, special alloys, metals, refractories, and mines/metals. This was announced by the chairman of the coordination council of engineering group of CSIR laboratories, Prof. P.K. Jena, while addressing the council's meeting held at National Environmental Engineering Research Institute, Nagpur, on 20 January 1983. □

CFRI's β-naphthol process released to one more firm

The process for β-naphthol, which Central Fuel Research Institute (CFRI), Dhanbad, had developed earlier, has been released to a firm through National Research Development Corporation of India. The firm, Oswali Chemicals Ltd, Bangalore, is expected to set up a production unit of 1000 tonnes per annum capacity at Cuddalore in Tamil Nadu. This is the second firm to acquire this process, covered by Indian patents. The firm to which the process was released earlier—Eastern Naphtha Chemicals Ltd, Dhanbad—is producing, at its Bokaro industrial area plant, 99.5% pure β-naphthol without any trouble. □

DEPUTATION BRIEFS

Shri S. Chidambaram

Shri S. Chidambaram of Central Electrochemical Research Institute (CECRI), Karaikudi, visited UK from 26 September to 29 December 1982 under the CSIR-British Council Exchange Programme. Working at the Electrochemical Process Engineering Division of University of Newcastle-upon-Tyne, under the supervision of Prof. F. Goodridge, head of the Department of Chemical Engineering, he studied the following electrode assembly/electrolytic cells: fluidized-bed electrodes, filter press cell (monopolar and bipolar) and sieve bed electrode. In association with a research associate, he determined the mass transfer coefficients in a plate and frame cell under turbulent conditions with a view to expressing the mass transfer data through a correlation in terms of dimensionless quantities. Another study with which Shri Chidambaram was associated was the electrochemical reduction of substituted hydroxylamines. The order of the reaction was determined and preparative studies were carried out on an experimental H-type cell, the products being analyzed by IR and VPC.

The CECRI scientist also attended a computer training course and visited a number of research centres working on electrochemical processes.

* * *

Shri K.S. Balaraman and Shri M.B. Sabne of National Chemical Laboratory (NCL), Pune, who were deputed to Czechoslovakia from 9 August to 2 November 1982, under the bilateral exchange programme between CSIR and Czechoslovak Academy of Sciences, worked at the Institute of Macromolecular Chemistry, Prague.

Shri Balaraman determined the microstructure and SLD of SAN copolymers, synthesized in NCL's batch reactor, through ^{13}C NMR. He also worked out a methodology for determining molecular weight distribution of SAN copolymers by gas-phase chromatography. Shri Sabne synthesized two copolymers from N-methacryloyl-2-(4-aminophenyl)acetic acid and ethyl N-methacryloyl-2-(4-aminophenyl)acetate with styrene using free radical initiators.

Also, Shri Balaraman discussed with the scientists of the Institute of Process Fundamentals, Prague, the mixing models used in continuous polymerization reactors, the thermal effects in polymer flow, and specific problems encountered in polymer production in continuous reactors.

Both the scientists visited other academic institutions and polymer industries in and around Prague. □

Prof. Yermakov of USSR at CFRI

Prof. Yu I. Yermakov, Professor of Chemistry, Institute of Catalysis, USSR Academy of Sciences, who visited Central Fuel Research Institute (CFRI), Dhanbad, on 11 February 1983, delivered a lecture on 'Novel highly active catalysts'. Synopsis of Prof. Yermakov's talk:

In the past decade considerable advances have been made in the field of catalytic polymerization of olefines, with the development of novel and highly efficient catalysts for ethylene and propylene polymerization (new-generation catalysts). The main approach to the preparation of these catalysts consists in supporting transition-metal compounds on various carriers. Supported organometallic catalysts prepared through interaction of organic or hydride compounds of transition metals with oxide supports (SiO_2 or Al_2O_3) are more active in olefin polymerization than the classical

Ziegler-Nata catalysts. The enhanced activity is due to the increase in the number of active centres and propagation rate constants. Another interesting field of application of organometallic compounds is in the preparation of superdispersed sulphided particle-active species (supported sulphided catalysts) in industrially important hydro-treating reactions, e.g. hydrogenolysis of thiopene.

Another significant trend is in the preparation of homonuclear or heteronuclear surface species from organometallic precursors (supported clusters or superdispersed particles) for use in catalytic reactions like polymerization, hydrogenation, and oxidation. The technique results in a higher concentration of active centres (resulting in catalytic activity even at low temperatures) in comparison with that in conventional methods of catalyst preparation. □

PROGRESS REPORTS

CFRI Annual Report: 1981-82

The major areas of research at Central Fuel Research Institute (CFRI), Dhanbad, according to its annual report for 1981-82 published recently, continued to be: Coal resource quality assessment, Preparation of coal, Technology for direct use of coal, Coal conversion, and Product improvement and valorization. As many as 125 subprojects were pursued under 38 major projects.

Over 18,000 m of core length from nearly 875 boreholes covering 90 prospecting blocks in 30 coalfields was processed and over 43,000 samples were analyzed. Besides borehole coal samples, more than 5000 samples of coal from working collieries were analyzed for physical and chemical characteristics.

In Dharmaband, Tasra, Angarpathra, Sendra-Bansjora, Ekra Khas and Patherdih areas in Jharia coalfield, coals up to a depth of 200 m were found suitable for metallurgical use, while in Singaran area, the depth limit of coking coals was 800 m (earlier, in part of the area the depth limit was 1000 m). In West Bokaro, the Kotre-Basantpur coals have strong coking propensities, whereas the Raniganj Measure coals are of medium coking quality. The properties of underlying Barakar coals approach those of the prime coking coal variety. A number of coals (Parej and Kuju) in West Bokaro coalfield, some of which are of medium coking quality, give fairly good yields of cleans on washing. A special feature of these coals is that the −3 mm size fraction consisting of 15-20% by wt of the raw coals gives lower (by 4-6 units) ash content than the respective overall coals.

Detailed petrographic studies were carried out on 45 samples in connection with the Mukunda open-cast project, for Central Mine Planning and Design Institute on sponsorship basis and on 150 samples in connection with the expansion of Bhilai Steel Plant. Regional metamorphism studies of Kargali seam in East Bokaro coalfield exhibited a concordant relationship between structural and iso-rank lines.

Under a joint venture of CSIR and Steel Authority of India Ltd, a 20 tonnes per hr oleoflotation plant based on CFRI process was incorporated in the Sudamdih washery for evaluating the efficiency and economics of the oleoflotation process for the upgrading and dewatering of coal slurry in the washery. The Regional Research Laboratory (RRL), Bhubaneswar, another CSIR laboratory, is associated with this project and preliminary studies on Chasnalla washery fines carried out both at CFRI and RRL showed the potentiality of the technique. It is proposed to set up a test rig involving 400 mm and 600 mm columns at Sudamdih washery flotation circuit to study the process on a pilot-plant scale.

The Bharat Coking Coal Ltd undertook the installation of a 10 tonne per hr oil-agglomeration unit based on CFRI know-how for beneficiation of washery slurry at Patherdih washery. The results of the studies carried out by the laboratory show that a 33% reduction in oil consumption in the oil-agglomeration process could be effected by using suitable surface-active agents and electrolytes.

The laboratory's studies showed the feasibility of direct chemical demineralization of coke. Under an agreement, a private entrepreneur (Premium Coke Manufacturing Company, Dhanbad) would be setting up a 3-tonne per day pilot plant for chemical demineralization of coal, based on CFRI know-how.

A briquetting plant (production capacity, 25 tonnes per day) was installed and successfully commissioned near Dhanbad by Coke Gul Industries, Jharia, based on CFRI know-how.

About 100 tonnes of low-phosphorus formed coke were prepared from low-temperature char of Churcha, Chirmiri coals (Madhya Pradesh) using processed tar binder for trial tests in the low-shaft blast furnace of Kalinga Iron Works, Barbil (Orissa). Fifty tonnes of the product were supplied to the party.

A double-chamber domestic *chullah* (stove) was fabricated and put to test with Churcha coal (ash 19.1%). In this *chullah*, the green coal is carbonated in the outer chamber and the resultant coke is burnt in the inner chamber. The *chullah* was found to be quite smokeless with a thermal efficiency of 25-27%.

Sixty pilot-plant coking tests were conducted to select the optimum coal blend for the Bhilai Steel Plant. The tests revealed that 100%, rather than 80-85%, crushing through 3 m either selectively or by conventional methods results in a significant improvement in coke quality.

A two-stage fluid-bed gasification pilot plant was designed, fabricated and installed. An initial trial run of the unit was made with a view to regulating and controlling feed coal as also the air flow and to studying the condition of the bed under fluidized state.

In continuation of the study on combustion and heat-transfer charac-

teristics of Indian coals in a fluid-bed combustion system, further tests under varying operating conditions with 1.5 mm-0 size Jaykaynagar coal of Raniganj field and 3 mm-0 size carbonaceous shale of Korba field were completed. Difficulties encountered in operating the bed of the fluid-bed combustion boiler at temperatures above 800°C were overcome.

Attempts were made to improve the bench-scale process for production of sponge iron as preparatory to its trial in the 1.2 tonnes per day vertical retort furnace of National Metallurgical Laboratory (NML), Jamshedpur, for the reduction of iron ore-coal agglomerates prepared according to the CFRI process. Studies were made with Barrajamda iron ore and non-coking coal from Kothadih colliery, Raniganj coalfield. After successful demonstration of the process, a pilot plant would be installed for further studies. NML is collaborating in this project.

A process was developed for preparing 'Carboil' from coal with fuel oil instead of anthracene oil. Fifty kilograms of Carboil having a coal-fuel oil ratio of 1:4 was prepared for Central Mechanical Engineering Research Institute, Dhanbad, for preliminary combustibility tests.

Processes were developed for ammoxidation of *o*-, *m*- and *p*-xylenes to the respective phthalodinitriles. A plausible reaction mechanism was advanced for the ammoxidation of *p*-xylene to terephthalodinitrile; it also holds good for other xylene isomers.

An experimental unit was set up for studying the oxidation of xylenes to toluic acids using oxygen. With cobalt naphthonate as catalyst (0.025-0.05 mol/mol of xylene) a 30% yield of toluic acid could be obtained.

An yield of 42% of mixed pyridine bases was achieved by the cyclic addition reactions of acetaldehyde, formaldehyde, and ammonia. 2-Vinylpyridine monomer (yield 75-80%) was obtained by liquid phase condensation of α-picoline and formaldehyde under pressure.

A new type of combination fertilizer containing nitrohumic acid (NHA) instead of coal-acids was tested during the *kharif* season. This combination fertilizer, composed of urea and 10% NHA, showed about 20-25% increase in the paddy and straw yields in comparison with those when urea alone was used.

A quick method for determination of ash and moisture was developed. By this method, moisture in coal, depending on its rank from bituminous to lignites, could be determined in about 5-25 min., and ash in 30 min.

While studying the effect of different reaction variables on the preparation of silica gel it was observed that the presence of SO_4^{2-} in the gel system favoured the formation of fine pores while the use of precipitants favoured the formation of gel having wider pores and high pore volume. The study would help provide guidelines for controlling the texture of gels by varying the precipitating agents.

Fifty-four papers were published and 58 were communicated. Twenty-two reports were prepared, and five patents filed. Three volumes of *Indian Coals* series (Vols 3, 4 and 7) were brought out. □

NRDC Licensees of CBRI Processes

As many as 52 processes developed by Central Building Research Institute (CBRI), Roorkee, have been taken up by 213 parties through National Research Development Corporation of India; of these, 69 are stated to be in production. Besides, 28 parties have taken up processes relating to (i) activated lime pozzolana mixture, (ii) hydraulic binder from Kota stone, and (iii) sub-soil deformeter (*see* p. 52) directly from the laboratory; seven of these are in production. Seven products are being manufactured on the basis of CBRI know-how: (i) lime hydrator (trade name, LIM-O-HYDOR), (ii) Solar water heater (Sol-en Solar water heater), (iii) wood-wool boards (Anucool), (iv) waterproofing system for exposed brick masonry lime concrete (Aquaproof Expo), (v) silicate-based waterproofing formulations (Sealex and Aquaproof), (vi) activated lime pozzolana mixture [Lipco and ALPM (Hercules brand)], and (vii) hydraulic binder from Kotah stone (LIMENT). This information is contained in a directory (mimeographed) compiled by Shri D.V. Bansal and Shri A.C. Banerjee of CBRI. The directory (unpriced) can be had from: The Director, Central Building Research Institute, Roorkee 247672. □

PERSONNEL NEWS

Appointments/Promotions

SHRI R.N. PARLIKAR

Shri R.N. Parlikar of Regional Research Laboratory (RRL), Hyderabad, has been promoted as Scientist F (27 Dec. 1982). A mechanical engineering graduate from Osmania University, Shri Parlikar has been with RRL-Hyderabad since 1964. He now heads the division which undertakes design of pilot plants, prototype plants, and commercial plants. Shri Parlikar, who also holds a postgraduate diploma in business management, is currently engaged in the designing and commissioning of a low-temperature carbonization plant (900 tonnes of coal per day), and a saw-dust based activated carbon plant (200 tonnes per day) at Manila in Philippines. He is also associated with a fluid-bed based activated carbon plant (5 tonnes per day), which is under implementation at Kuala Pilah in Malayasia. Of the other assignments handled by him mention may be made of a pesticides complex for Sudarshan Chemical Industries Ltd at Roha. One of the major activities of the group he heads concerns the development of equipment for chemical industry. He has innovated a mechanism for selective injection of gas into a bed of solids in a rotary kiln for carrying out gas-solid reactions.

Shri Parlikar has visited USA, the Philippines, and Malaysia. He has to his credit 15 technical reports and 6 patents. □

* * *

At National Chemical Laboratory, Pune, the following have been appointed to the position Scientist B with effect from dates given in parenthesis: Shri P.P. Thankachan (3 Dec. 1982), Shri Saurav Pal (9 Dec. 1982), and Dr S. Sivaramakrishnan (25 Feb. 1983).

* * *

At Structural Engineering Research Centre, Madras, the following have been appointed to the position Scientist B with effect from dates given in parenthesis: Shri N. Pandian (31 Jan. 1983), Shri S. Arunachalam (4 Feb. 1983), Shri S. Natarajan (14 Feb. 1983), Kum. Selvi Rajkumari (16 Feb. 1983), and Dr P. Ramachandra Rao (24 Feb. 1983). □

Transfers

Dr G.N. Badami, Scientist F, Central Building Research Institute, Roorkee, has been transferred to Structural Engineering Research Centre, Madras (2 Feb. 1983).

Retirements

DR R.M. JOSHI

Dr R.M. Joshi, Scientist EI, of National Chemical Laboratory (NCL), Pune, retired on 31 January 1983 after 32 years of service.

Dr Joshi's contributions to polymer science have been recognized the world over. He has innovated a bond-energy scheme for identifying chemicals and assigning component values for estimating the thermodynamic properties. He has applied this scheme to carbon, hydrogen, halogens, oxygen, sulphur, and nitrogen. He ultimately envisages a mini-computer with stored (bond-wise) entropy and energy parameters, which may be used for the total prediction of chemical reactions and reaction equilibria.

His interest in electronics as a hobby has led to the designing of an osmotic balance known after him and an 'isothermal calorimeter'. He has used this calorimeter for obtaining reliable thermochemical data on polymerization and for demonstrating, for the first time, the homopolymerization of maleic anhydride.

Dr Joshi has contributed an invited article in the 'Encyclopaedia of Polymer Science and Technology' and a chapter in the book 'Vinyl Polymerization'. □

* * *

Shri S.K. Das Gupta, Art Officer C, Publications & Information Directorate, New Delhi, retired on 28 February 1983.

Honours & Awards

RRL-Hyderabad scientist wins 'Best Invention Award'

Dr M. Sundara Ramaiah of Regional Research Laboratory (RRL), Hyderabad, has won the 'Best Invention Award' at the 43rd All India Industrial Exhibition-1983 held at Hyderabad. The award was given for excellence in applied research on microvoid coatings. Others who collaborated in the research project were Dr R. Vittal Rao, Dr M. Yaseen, and Dr M.A. Sivasamban, all of the same laboratory.

The technique, which has a vast industrial potential, is the result of a pioneering piece of work. The award included a cash prize of Rs 500, besides a citation.

* * *

Dr S.K. Date of National Chemical Laboratory, Pune, has been elected a fellow of Maharashtra Academy of Sciences in recognition of his valuable contributions to solid-state materials research.

* * *

Shri I.N. Sengupta, Scientist in charge of the Library and Documentation Unit of Indian Institute of Chemical Biology, Calcutta, has been nominated president of the documentation committee of Indian Association of Teachers of Library Science. □

NISTADS shifts to PID building

The National Institute of Science, Technology and Development Studies (NISTADS) has shifted from CSIR Complex premises (inside NPL campus) to Publications & Information Directorate's (PID) building, on Hillside Road, New Delhi 110012. (INSDOC is now functioning from 14 Satsang Vihar Marg, off S.J.S. Sansalwal Marg, Special Institutional Area, New Delhi 110067: Telephone 665837).

Prof. A. Rahman, Director of NISTADS, has shifted from CSIR Headquarters (Rafi Marg) to NISTADS's new location. (Telephone 583227; PABX No. 586301; Telegrams: NISTADS, N.D.). □

ANNOUNCEMENTS

Seminar on Management of Chemical Process Industries

A national seminar on Management of Chemical Process Industries, sponsored, among others, by National Chemical Laboratory, Pune, and organized by Delhi Productivity Council, will be held on 22-23 April 1983 at Vigyan Bhavan, New Delhi. The objective of the seminar is to facilitate exchange of experiences in relation to infrastructure management, project implementation, maintenance management, energy management, management of technology, and management of product development and marketing.

The participants will comprise senior executives and technocrats in chemical industry in both the public and private sectors, scientists and managers from R&D organizations, industrial and management consultants, and finance experts. □

COUNCIL OF SCIENTIFIC & INDUSTRIAL RESEARCH

Advertisement No. 7/83

It is proposed to appoint three Scientists F (scale of pay: either Rs 2000-125/2-2500 or Rs 2250-125/2-2500-EB-125/2-2750) at Central Fuel Research Institute, Dhanbad. The posts are one each in the fields of coal hydrogenation, design engineering/coal combustion, and assessment of coal resource quality.

Further details about the posts and prescribed pro forma for sending curriculum vitae obtainable from Joint Secretary (Administration), CSIR, Rafi Marg, New Delhi 110001. Deadline for receipt of applications at the above address: 25 *May* 1983. □

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Transfer of Rural Housing Technology to Villages

A CSC regional workshop on 'Transfer of Rural Housing Technology to Villages', organized by Central Building Research Institute (CBRI), Roorkee, from 2 to 4 February 1983, in collaboration with the Commonwealth Science Council (CSC), provided a forum for the exchange of knowledge and experiences in rural housing and environment among the participating delegates. The workshop also identified the areas of mutual cooperation and assistance.

Attended by 24 delegates, including 10 foreign participants from Bangladesh, Papua New Guinea and Sri Lanka, the workshop spanned five technical sessions in which some 14 technical papers were presented and discussed. The papers covered house design, construction techniques, sanitation and drainage, environmental improvement, and utilization of agricultural wastes for production of energy. The delegates, who were also the national coordinators from their countries, also submitted brief reports of their country's work on the workshop's theme.

Dr H.S. Rao, Managing Director of National Research Development Corporation of India, New Delhi, in his inaugural address, emphasized that the design, materials, and techniques for rural housing should be commensurate with villagers' mental make-up, their age-old traditions and culture as well as their life-styles. For effective technology transfer, he laid stress on the role of voluntary agencies. These, he said, should take up appropriate technologies and set up training-cum-demonstration centres in different regions of the country.

Shri R.C. Mangal, CBRI's Acting Director, spoke of the contributions made by the institute in rural housing, highlighting those relating to fire-retardant thatched roof; non-erodable mud plaster for mud walls; wastewater disposal system; low-cost latrines; and biogas plants; and housing systems for the rural poor.

Dr Jai Krishna, ex-Vice Chancellor of University of Roorkee, and presently Professor Emeritus at the same university, inaugurated an exhibition relating to the topic of the workshop.

How CBRI was transferring relevant technologies to the villages was shown to the delegates by taking them to two nearby villages. At Mewad Kalan village, Shri Narendra Verma, head of Rural Building & Environment Division of CBRI, explained the institute's work on fire-retardant thatches, low-cost latrines, biogas plants, and wastewater disposal system—all of

Dr H.S. Rao, Managing Director of NRDC, addressing the delegates at the workshop. Seated on the dais are (from left) Dr Jai Krishna, former Vice Chancellor of University of Roorkee, Shri R.C. Mangal, Acting Director of CBRI, Shri K.N. Johry, head of International Science Collaboration Division of CSIR, and Shri Narendra Verma, head of CBRI's Rural Building & Environment Division.

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which were constructed and adopted by the villagers. At Rohalki, the delegates saw fire-retardant thatched roof, prefabricated brick panel system, and wastewater disposal system—all these also introduced there by CBRI and adopted by the villagers.

Recommendations

The workshop made a number of recommendations to promote transfer of technology to rural areas. It called for (i) thorough studies on the merits and demerits of local materials and traditional construction technologies before the scientists embark on any programme of transfer of technology; (ii) taking up of at least one demonstration project in each country, where a maximum number of innovations could be incorporated; (iii) choosing the technologies and materials for demonstration according to the acceptability, adoptability and limitations of the villagers; (iv) encouraging participation of the villagers in the development and implementation programmes; (v) seeking cooperation of social welfare organizations and educated youth; (vi) giving wider publicity through mass media like radio, television, and films; (vii) identifying CSC centres in each country as nodal points for exchange of documents, information, etc. on reciprocal basis; (viii) making use of sophisticated scientific knowledge and microcomputers in the process of transfer of technology to rural areas in order to save the time of qualified professionals.

Recognizing the importance of dissemination of both theoretical knowledge and practical experience, the workshop recommended, among others, the promotion of education and practical training through exchange of visits of technical personnel within the countries covered under CSC.

The consensus of the delegates was in favour of extending the life of the current programme of CSC by a year as most of the countries had not completed their respective projects and, as a result, were unable to do cost-benefit analysis of the inputs.

A recommendation was also made that one more workshop should be organized after about a year in any one of the participating countries, so as to pool their final experiences and to chalk out the future strategies of action in the transfer of technology to rural areas.□

ITRC's Ecosystem-cum-laboratory complex dedicated to the nation

Prof. M.G.K. Menon, Member of Planning Commission (Science), dedicated to the nation a sprawling 85-ha Gheru Campus—an ecosystem-cum-laboratory complex—of Industrial Toxicology Research Centre (ITRC) at a ceremony held on 12 March 1983. The campus is about 22 km from Lucknow city on Lucknow-Kanpur Road.

Speaking on the occasion, Prof. Menon described the campus as ITRC's Director* Dr C.R. Krishna Murti's dream child—a vision which had become a reality. He said that field studies of the chemical effects of animal, plant and human life to be carried out at the campus would go a long way in the welfare of the public. With the tremendous growth of population there had to be an increase in food production, and for this, pest control was necessary, Prof. Menon said. The growth in the industrial production had posed more problems of air and water pollution. Many of these pollutants are known to have caused serious health problems. Prof. Menon also underlined the need to develop techniques for treating industrial effluents suited to the country's conditions. He urged the scientists to conduct research on the use of microorganisms for combating pollution. Work on the development of microorganism technology was well within our capability and resources, he affirmed. In this context, the Gheru

*since retired

Prof. M.G.K. Menon, Member of Planning Commission (Science), dedicating Gheru Campus of Industrial Toxicology Research Centre to the nation. To his left are Dr C.R. Krishna Murti, Director of ITRC, and Dr B. Sampath, Director of IIT, Kanpur.

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C.F.R.I. MYSORE

Complex was the frontier of biomedical and environmental sciences, he felt.

Environmental pollution should be studied from the angle of health hazards to man, animals and the ecological system, Prof. Menon suggested. In this context, he disclosed that the Science Advisory Committee to the Cabinet had recommended to the Government the enactment of a new comprehensive legislation on environmental control and monitoring.

Referring to CSIR's contributions, Prof. Menon said that though imports had been reduced because of the Council's work, there was need for development of indigenous capability in respect of standardization and quality control.

In his welcome address, Dr C.R. Krishna Murti traced the history of Gheru Campus since 3 May 1978 when the governing body of CSIR had approved an ITRC proposal to set up a central facility for safety evaluation of pesticides and industrial chemicals. Consequently, surplus land (of about 85 acres) was transferred to this laboratory by Central Institute of Medicinal and Aromatic Plants, Lucknow, and with the existing structures, a new laboratory—Central Facility for Safety Evaluation of Pesticides—was created for conducting toxicity studies on pesticides and pesticide formulations. Technologies for these formulations were the result of work done by RRL, Jorhat; RRL, Hyderabad; NCL, Pune; Hindustan Insecticides Ltd and some private sector industries. Dr Murti referred also to the master plan for development, during 1980-85, which contained proposals to add a sophisticated instrumentation laboratory; an inhalation toxicology laboratory; a toxicology information system; and laboratories for ecotoxicology, environmental carcinogenesis, microbial degradation, phytotoxicology, toxicology of cosmetics and materials, and disposal of toxic wastes. A residential complex of 150 houses for the staff members including amenities like a school, a health care centre, shops and recreational facilities were also proposed.

Stressing the need for conservation of environment, Dr Krishna Murti said that safety of man cannot be divorced from safety to his environment, and in the pursuit of this objective, the ecosystem complex and the laboratory complex—the twin components of the Gheru Campus—were a modest contribution towards the development of experimental environmental sciences in their broadest perspective.

In his message, Dr T.N. Khoshoo, Secretary in the Department of Environment to the Government of India, said that the establishment of the campus is an experiment in progress. The mini-forest ecosystem that had sprung up at Gheru was expected during the next 10-15 years to develop into a model Indo-Gangetic sylvan ecosystem. Gheru was an ecosystem in its growth phase which provided opportunities for the study of insect dynamics, soil chemistry, recycling of nutrients and growth of plants, he said. Facilities were developed at Gheru as a backup support for exploring the impact of chemicals on the ecological equilibrium. Environmental pollution had to be studied both from the point of health hazards to man and animals and the hazards to natural ecosystems. The Department of Environment was deeply committed to encourage such studies, he assured the scientists. Expertise in the area of management of toxic and hazardous wastes to devise safe means of disposal of toxic wastes without damaging our environmental compartment was urgently required, concluded the former NBRI's Director.

Dr B. Sampath, Director of Indian Institute of Technology, Kanpur, emphasized the need to cultivate a new quality of science to fulfil human needs. He also released a brochure on ITRC and Gheru Campus. □

Recent Advances in Catalysis and Catalytic Reaction Engineering

Seven plenary lectures, 23 papers and 16 poster papers summed up the latest advances in catalysis at the title symposium held at National Chemical Laboratory (NCL), Pune, 5-7 February 1983. The symposium, organized by this CSIR laboratory in association with the Catalysis Society of India (CSI), was attended by delegates from 14 countries, besides India. Of the papers presented at the symposium 40% were from the industrial corporate R and D centres, 40% from government research laboratories and institutions, including from foreign countries, and the remaining 20% from academies, as Dr Paul Ratnasamy (NCL), CSI's secretary, stated in his welcome address. Prof. J.C. Kuriacose (IIT-Madras), president of society, while tracing in his address the history and objectives of the learned body, said that it aims at breaking the barrier between basic work carried out mainly in academic institutions and applied work done in industrial R and D centres.

Dr L.K. Doraiswamy, NCL's Director, in his opening remarks, underscored the importance of catalytic reactions in chemical, petrochemical, polymer and biochemical industries. He said that the chemical industry was growing fast in the country and that many of the processes would require catalytic reactor designs as well as good understanding of energetics of catalyst surface. Such work on catalysis and catalytic reactor design was being carried out in many laboratories in the world. Stressing the need for an integrated approach, that of combining the catalytic chemistry and the reactor design or reactor analysis, he mentioned that NCL had been paying considerable attention to this area of work—an area of immense and continued importance in the chemical sciences. The worldwide advances in this field had led to the

successful development of a number of novel and economically attractive processes, particularly in the field of bulk organic chemicals and petrochemicals, he added. The laboratory had already established itself as a centre of excellence in this field and had developed processes which were in commercial production, the NCL Director added.

Dr Paul B. Weisz, Vice President of Mobil Research Centre, USA, who has made outstanding contributions in catalytic chemistry and technology, delivered a keynote address in which he described new developments and technological applications of a new shape-selective catalyst based on high-silica zeolite called ZSM5. With the recent advances in experimental techniques, he said, it had become possible to study the active sites in zeolites. The NMR studies had revealed that even in zeolites with as low as 10 ppm aluminium content, Al ions are included in the regular tetrahedra of the zeolite structure. The shape-selective nature of zeolites with unusual selectivities and long catalyst life had led to the development of new and economical petrochemical processes in aromatic processing that yield fine-quality chemicals, *p*-xylene, ethylbenzene, fuels and lubricants. New synthetic fuels from one-carbon atom utilize the shape-selective characteristic properties of synthetic zeolites, said Dr Weisz.

The first technical session was devoted to the preparation and catalytic reactions over high-silica ZSM5-type zeolites and the mechanism of conversion of methanol to hydrocarbons.

Dr Henrik Topsøe (Denmark) discussed the nature and functioning of hydroprocessing catalysts, particularly Co-Mo-Al catalysts. The superiority of Mössbauer spectroscopy to other spectroscopic techniques in identifying the active phases was well illustrated. Further, the Danish scientist observed that the Co-Mo-S phase, as revealed by Mössbauer emission spectroscopy, appears to be the most active phase for this reaction.

Dr H.J. Lovink (The Netherlands) discussed the trends in fcc catalysts with the advent of Y-type zeolites. There had been improvement in fcc catalysts at regular intervals. Not only the activity and stability but also the selectivity of these catalysts had been improved. Dr Walter Heierli (USA), in a plenary lecture, dealt with studies using Auger and ESCA on Ni-Al catalysts used for methanation of coal gas and natural gas.

In another plenary lecture, Dr L. Marosi (BASF, FRG) highlighted the uses of ZSM5 and ZSM11 high-silica zeolites and B- and P-incorporated zeolites. The speaker also discussed the application of these catalysts for a variety of reactions like alkylation of aromatics, and conversion of methanol into hydrocarbons, and the high selectivity of these catalysts in the above processes.

Dr P. Rylander (Engelhard, USA) spoke on the use of precious metals to manufacture organic chemicals; Dr G. Patel spoke on selective hydrogenation processes. Their papers threw light on the use of noble metals like platinum and rhodium as reforming, hydrogenation and methanation catalysts.

Dr L.K. Doraiswamy, in his plenary lecture on 'Instability in chemically reacting systems', explained the oscillation occurring between more than one steady state existing in chemical systems. He considered theoretical models to explain such unexpected behaviour as threshold activity and sudden deactivity in the oscillation reactions. He also explained the reasons for the instability and the chaos resulting in the limit cycles of such systems.

Dr J. Laine (Venezuela) spoke on the catalytic activity of the Ni-Mo oxide catalyst system for hydrodesulphurization reactions. Dr R. Gopalakrishnan (IIT, Madras) presented the results of experimental temperature-programmed desorption (TPD) and theoretical extended Hückel molecular orbital (EHMO) calculations on adsorption and co-adsorption of CO and H over cobalt-metal catalyst. The mode of adsorption, the type of interaction and the probable surface species were deduced from TPD studies and EHMO calculations.

Dr Kuznetsov (Institute of Catalysis, Novosibirsk, USSR) reported the synthesis of alcohols from CO and H over Rh/La_2O_3 catalysts. On the basis of IR and NMR spectral data he reported (CHO_2^-)-type intermediates and also suggested a plausible mechanism for the formation of alcohols.

The plenary lecture by Dr L.V.C. Rees (UK) dealt with the Mössbauer spectroscopic studies of various adsorbed species like H_2O, ethylene, and ethanol on ferrous zeolites. Dr R.K. Grasseli's (Sohiox, USA) plenary lecture was concerned with the development of catalysts for oxidation reactions and on the solid state structural aspects and redox properties of these systems. His studies clearly indicated the importance of lattice oxygen participation in propylene oxidation on mixed systems like $Bi_2O_3.nMoO_3$, $U\text{-}Sb_3O_{10}$, and Fe_2O_3/Sb_2O_4.

Prof. Yu I. Yermakov's (USSR) lecture centred on the application of organometallic precursors for preparing supported catalysts. The homonuclear surface species, he reported, were prepared from (i) individual cluster complexes, e.g. $CO_2(CO)_8$, (ii) decomposition of anchored organometallic complexes, and (iii) phosphine complexes. The polynuclear surface species were prepared by (i) supporting heteronuclear clusters, and (ii) decomposing organometallic or phosphine complexes. The activity of these heterogenized homogeneous complexes was high because of their greater dispersion. One of the important applications which he reported was the preparation of superdisposed sulphided particles which are active species for hydrosulphurization reactions by de-

composition of organometallic complexes.

Dr Zakharov's (USSR) paper dealt with the preparation of new types of catalysts, namely supported organometallic compounds (Ti, Zr, Hf and U tetrahydroborate on oxide covers), Zeigler-type supported catalysts (supported $TiCl_4$ and Ti containing magnesium chlorides), and their catalytic activity towards olefin polymerization. The higher activity of these systems compared with the traditional catalysts is because of the change in nature and increase in the number of active sites on the support surface and the support-metal interaction. Dr N. Giordano (Italy) discussed the possibility of hydrogen storage in cyclohexene and cyclohexane systems using a catalytic route. The speaker also discussed the catalytic reaction engineering aspects of storage and transmission of hydrogen in this system as well as the economy of the process.

The self-diffusion of normal pentane, hexane, heptane and nonane in (Ca, Na)-A zeolites was presented by Dr L.V.C. Rees (UK). The activation energies and entropies for these processes show the importance of sorbate interactions. The self-diffusion, sorption and desorption coefficients were also obtained for the above systems and interesting cation and temperature effects of these coefficients reported.

DEEP SEISMIC SOUNDING STUDIES IN INDIA AND THEIR IMPACT ON OIL AND MINERAL EXPLORATION

The oil exploration programme in the Mahanadi delta area has assumed a new dimension with the introduction of the most sophisticated seismic technique—deep seismic soundings (DSS)—presently available in India only with National Geophysical Research Institute (NGRI), Hyderabad.

Encouraged by the success of DSS studies in different geological provinces in India, Oil India Limited (OIL) has engaged NGRI for carrying out DSS studies in the Mahanadi delta where the concentration for oil exploration is both on land and on the offshore region. OIL has already engaged the Geophysical Services International (GSI) of USA for carrying out shallow seismic surveys in the region. To substantiate, independently, the sub-surface details, especially under the traps up to basement, OIL has requested NGRI to carry out DSS studies in the Mahanadi delta along three profiles, totalling about 300 line km, with a view to locating sites for deep oil wells in the region.

At a cost of about Rs 60 lakh to the sponsor, the institute has started DSS field operations in the Mahanadi delta area.

DSS studies were started in India in 1972 as an Indo-Soviet collaboration project for three years. Under this project, DSS studies were carried out during the field seasons 1972-73, 1973-74 and 1974-75 along a 600 km long profile in the vicinity of 14°N latitude, starting from Kavali on the east coast and going up to Udipi on the west coast, running almost in an ENE-WSW direction. This profile cuts across two major geological structures, the Cuddapah basin and the Dharwar schist belt, in the Indian peninsular shield. The studies yielded a very detailed crustal structure down to the Moho discontinuity (about 40 km depth) with delineation of deep faults and fracture zones. As a result, the first deep crustal structure of India was published by NGRI's scientists. Subsequently, two DSS profiles, Guhagar-Chorochi and Kelsi-Loni, each about 200 km long, were covered during 1975-76 and 1977-78 in the Koyna dam area at the request of the Koyna Project Authority of the Government of Maharashtra. The objective of these two profiles was to delineate the deep crustal structure and to establish if there was any deep fault or fracture zone, movements along which could have been responsible for the 1967 Koyna earthquake and subsequent seismic activity in the region.

In the meantime, in connection with their oil exploration programme, the Oil & Natural Gas Commission (ONGC) requested this CSIR laboratory to carry out DSS studies (1976-77) along two profiles: first, Mehmedabad-Billimora (about 220 km length) in the Cambay sedimentary basin, and second, Navibandar-Amreli profile (180 km long) over the exposed Deccan Traps in Saurashtra. The objective of the first profile was to delineate (i) the granitic basement with estimate of the sedimentary thickness including Mesozoics (if present) under the buried Deccan Traps, (ii) the thickness of the Deccan Traps with their top and bottom demarcated, and (iii) the Moho configuration with delineation of deep faults. The main objective for Navibandar-Amreli profile was to find out the Mesozoic sedimentary thickness below the exposed Deccan Traps so as to evaluate the oil prospects in the Mesozoics. All the above objectives put forth by ONGC were achieved through the DSS studies.

The Himalays

During the field season 1978-79, DSS studies were carried out along Muqam-Gulmarg-Thanamandi-Naoshera profile across Pir Panjal range of the Himalayas. Besides, under an international Pamir-Himalayan project during 1974, 1975 and 1978, large explosions of 5-ton charge were fired in the Qarrakol lake, 10-ton charge in the Zorkol lake area in USSR, and 2- to 3-ton charge in the Nangaparbat area in Pakistan, the explosions being recorded along several spreads in the Srinagar valley in India. These studies yielded the crustal structure across the high mountain ranges of Tien Shan-Pamir-Karakorum-Himalayas.

Cuddapah basin

During the field season 1979-80, a second DSS profile, Kurnool-Ganapeswaram, was shot across the

northern part of the Cuddapah basin which yielded very interesting crustal details. Based on the results, a deep tectonic map of the basin was prepared which gives a new insight into the geological evolution of this mineral-rich basin.

Exploration for coal

At the request of the Geological Survey of India, NGRI carried out DSS studies along two profiles across Sone-Narmada lineament under the CRUMANSONATA project. The institute completed during the 1980-81 and 1981-82 field seasons DSS studies along Ujjain-Nepanagar-Mahan profile and Khajuriakalan-Chicholi-Multai-Pulgaon profile each about 300 km long. The results along the first profile have revealed the extension of Gondwana basin with a maximum thickness of Gondwana sediments of about 1.7 km under a thin cover of Deccan Traps of about 400 m thickness. The results hold promise of finding new reserves of coal in a vast area about 100 km × 100 km under a thin Deccan Trap layer which can be easily penetrated with the present-day drilling technology and mining. Thus about 3000 line km of DSS profiles have been covered in India so far over different types of geological settings.

Research contributions to DSS technique

Three new methods have been developed for interpreting DSS data: (i) a new computerized method for finding effective velocity from reversed-reflection travel-time data, (ii) an indirect seismic method for determining the thickness of a low-velocity layer underlying a high-velocity layer, and (iii) an analytical migration method for crustal wide-angle reflections. The second method has enabled the determination of the thickness of Mesozoic sediments under Deccan Traps in the Cambay basin and Saurashtra, which may lead to prospects of oil in the Mesozoics hitherto unexplored in India. The NGRI's DSS group has made new strides in the research and development in the technique.

A school of excellence in DSS — the only one in India — has been established at NGRI whose expertise can cater to the needs of such studies not only in India but in the entire south-east Asia, where such facilities do not exist. □

NAL provides consultancy in setting up turbocharger facilities

The National Aeronautical Laboratory (NAL), Bangalore, rendered consultancy to Hindustan Brown Boveri Ltd (BBL), Baroda, on building up a test plant facility for production of turbocharger units utilizing, wherever possible, indigenous components. While venturing on a collaboration with their principals for indigenous manufacture of turbochargers, BBL were required to set up the test plant. Import of components along with know-how for this facility would have been expensive.

Suggestions and support were provided to the firm among others, on: (i) design of components for test-plant facility, (ii) setting up of measuring and monitoring instruments, (iii) choice and specifications of equipment, (iv) drafting of materials specifications, (v) technical scrutiny of offers, and (vi) start-up of plant and procedure for turbocharger test running. □

Characterizing algal proteins

Following the standardization of the technology of mass-culturing of the blue green alga *Spirulina platensis* and of the green alga *Scenedesmus acutus* by Central Food Technological Research Institute (CFTRI), Mysore, a researcher of the institute, Smt. Anusuya Devi, has studied the biochemical and nutritional characteristics of the proteins of these two algae.

Proteins constitute a major part of the dried algae (45-55%), the other constituents being vitamins, minerals, and pigments. The physicochemical characteristics of the proteins of the algae were studied through gel filtration, PAG-electrophoresis, ion-exchange chromatography, and sedimentation velocity. About 80% of the total proteins of the algae was extractable, the bulk existing in the form of a protein-pigment complex.

To find out the potential application of the *Spirulina* protein in food industry, functional properties such as water and fat absorption capacity, foaming capacity and stability, and emulsification capacity of the protein were studied. The *Spirulina* protein was found to be comparable with the soyabean protein. A *Spirulina* protein concentrate with 75% protein was prepared which had good functional properties. An important photosynthetic plant protein, C-phycocyanin, was isolated and purified in a homogeneous form from *S. platensis* and its properties were studied.

In animal experiments using rats the algal protein quality was established by protein efficiency ratio and metabolic studies. The protein quality was further established by protein depletion-repletion in rats by serum protein regeneration studies and some of the liver enzyme activities. The *in vitro* protein digestibility of the algal protein was studied by using pepsin-pancreatin system. Both the algae supplemented well with cereals like rice and wheat. In animal experiments there was a significant lowering of serum and liver cholesterols when algae were used as protein source. The hypocholesterolemic property of the algae has been established for the first time. *Scenedesmus* was found to be more effective than *Spirulina* in this attribute.

Since world-wide attention is being paid to algae as an unconventional protein source for use in feed and food, the results of the study hold out promise in meeting the increasing demand for protein in developing countries. Furthermore, biomass productivity has potential applications both for bioenergy conversion and treatment of effluents.

Smt. Anusuya Devi, who carried out the study under the guidance of Dr L.V.

Venkataraman, was awarded Ph.D. degree by Mysore University. □

EXTRAMURAL RESEARCH

Metal complexes of nucleosides

Under a CSIR research scheme granted to her, Dr (Smt) Badar Taqui Khan of the Department of Chemistry, Osmania University, Hyderabad, has carried out physico-chemical studies on binary and ternary metal complexes of guanosine, cytidine, and uridine. In the ternary complexes the metal ion, ligand and secondary ligand (secondary ligands being 2,2′-bipyridyl, 1,10-phenanthroline and 5-sulphosalicylic acid) were in 1:1:1 ratio. Besides, metal complexes of the type ML_2 (L = ligand) were also studied. The stability constants of these complexes determined at 15°, 25°, 35° and 45°C were used for calculating the thermodynamic parameters ΔG°_F, ΔH°_F and ΔS°_F.

Two research fellows, Shri R. Madhusudhan Raju and Shri Mir Akbar Ali, were associated in the above work, and one of them, Shri Raju, was awarded Ph.D. degree (1982) by Osmania University for his thesis entitled 'Binary and ternary complexes of bivalent metal ions with nucleosides'.

The CSIR scheme has been further extended to enable Dr Khan to study mixed ligand complexes of platinum group metal ions and their polynuclear complexes with purines, pyrimidines, nucleosides, and nucleotides. The interaction of platinum group metal complexes with purines, pyrimidines and nucleosides has acquired a new significance in recent years since certain complexes of platinum, specially $Pt(NH_3)_2Cl_2$, have been found to exhibit anticancer activity.

Dr Khan would be carrying out these investigations in three parts. In the first part, mixed ligand complexes of platinum group metal ions with purine bases or nucleosides and a secondary nitrogen donor ligand like polyamine, substituted polyamine, α,α-bipyridyl, *o*-phenanthroline, imidazole, substituted imidazole and amino acids would be investigated. In these mixed ligand complexes the effective charge on the metal ion and the donor sites can be controlled by binding to the suitable nitrogen donor ligands, which in turn would control the interaction of metal ion with purine bases and nucleosides.

In the second part, polynuclear and a few cluster complexes of Ru & Rh and Ir & Os would be prepared and interacted with purine and pyrimidine bases and their corresponding nucleosides. These complexes would be characterized by physiochemical techniques.

The equilibrium studies in aqueous solution for the interaction of Ru(III), Rh(III) and Pd(III) complexes with purines, pyrimidines, nucleosides, nucleotides, and amino acids would be carried out in the third part. These studies are important since interaction in biological systems takes place in aqueous solution. The nature of the species found in solution and the thermodynamic parameters associated with the interaction of these metal ions with the above biomolecules would be valuable for designing specific anti-cancer drugs. □

PROGRESS REPORTS

NIO Annual Report: 1981

The annual report of National Institute of Oceanography (NIO), Goa, for 1981, published recently, shows that the most significant achievement of the laboratory during the year was the hauling up of the first sample of polymetallic nodules and subsequently locating their massive deposits in the western Indian Ocean. Collected from a depth of 3.5-4.5 km, these nodules contain nickel, copper and cobalt besides manganese and iron. The concentration of the nodules was found to be 1.1-5.8 kg/m^2, a range economically attractive for mining. With this, India became the first country in the Third World and seventh in the world to possess the know-how of deep-sea mining. A major programme of exploratory mining has been drawn up in collaboration with the Department of Ocean Development.

R V *Gaveshani*, India's first oceanographic research vessel, successfully completed her 100th cruise during the year. Since her commissioning in February 1976, the research vessel has undertaken many challenging assignments such as exploration of polymetallic nodules, development of offshore oilfields, location of rich fishing grounds, monitoring of oil pollution, and participation in MONEX-79. In 1981 R V *Gaveshani* completed 17 cruises and collected data from 432 stations.

Studies made in the field of physical oceanography revealed several interesting features of the seas around India, thus leading to a better understanding of the monsoon. For instance, studies on hydrographic conditions in the east-central Arabian Sea indicated the withdrawal of the equatorial water with the advancement of the monsoon season.

The data collected during MONEX-79 were processed and sent to the India Meteorological Department. These indicated that the downward heat flux is an important factor and accounts for more than 50% of the total heat loss from the surface layer, contributing to the lowering of the sea surface temperature. Studies on oceanic mixed layers in the Bay of Bengal showed the formation of three mixed layers, viz. wave-mixed, diurnal, and transition layers. The first two layers showed immediate response to changes in the prevailing weather and sea state conditions.

The continuous monitoring of oil pollution along the oil tanker route in the Arabian Sea indicated several-fold increase in tar concentration over the last three years.

Geological and geophysical surveys were made with a view to deciphering the regional geology and assessing the petroleum and mineral prospects of the western continental margin off Mangalore. These included more than 850 lkm (line km) of echosounding, 60 lkm of side scan sonar, 1050 lkm of seismic profiling and 1115 lkm of

magnetics, followed by seabed sampling. Also, geochemical investigations were continued on the sediments of western and eastern continental shelves of the country. On the western continental shelf, studies were concentrated on the shelf region between Mangalore and Cochin. Bulk sample analyses in respect of several elements were completed and the distribution map was prepared. On the eastern continental shelf the study of overall distribution patterns of Mn and Ti were completed and data relating to partition of Al, Fe and Ti in acetic acid, acid-reducing and HCl leaches were processed. The suspended particulate matter concentrations in the Hooghly estuary were studied during the period of high river discharge. In addition, with a view to understanding the geochemical behaviour of some of the elements like Fe, Mn, Co, and Cu from fluvial to estuarine environments, investigations were carried out on the sediments of Vembanad Lake in Kerala.

Exploration for ilmenite placers off Konkan coast (between Jaigarh and Vijayadurg) indicated that the gradient of seabed is steep up to a depth of 8m, beyond which it is gentle. The sand extends to a distance of 2-5 km offshore to a water depth of 9-15 m, beyond which it is covered by recent clays. Heavy mineral concentration varies from 1 to 9%, of which ilmenite constitutes 51% and magnetite 1-31%. The ilmenite in these sands contains up to 52% of TiO_2 and minor amounts of vanadium as V_2O_5. Seabed surveys were completed and these concerned the development of New Mangalore and Karwar ports.

Surficial geological studies of the Direction Bank situated 40-45 km offshore of Bombay-Murud have indicated the presence of an acoustically transparent layer, which varies from 5 to 55 m in thickness. The southern part of the bank showed acoustic masking owing to the presence of gases up to 15 m below the seabed.

A new project on paleoclimatic studies on the nature of the summer monsoon over India during the past 10,000 years was taken up.

An aquaculture laboratory with running sea water with an assured supply of pure sea water and all the modern research facilities was commissioned at the institute. Projects concerning coastal aquaculture included: induced breeding in mullets, commercial culture of mussels, unialgal culture, and seaweed cultivation.

A positive relationship was established between the benthic standing crop and the demersal living resources in the shelf area off Konkan coast.

A laboratory model of an ocean thermal energy conversion (OTEC) plant of 200 W capacity was being fabricated. Status reports on OTEC, tidal power, wave energy, salinity power, and coastal aquaculture in India were prepared.

A data buoy system consisting of seven sensors, viz. wind speed, wind direction, buoy heading, air temperature, sea surface temperature, buoy temperature and relative humidity, was designed and developed. Also, the development of a self-recording tidal instrument with a pressure transducer fabricated at Indian Space Research Organisation, Bangalore, was attempted.

The institute undertook 12 new sponsored projects for public as well as private sectors. These projects were on pollution control and monitoring, harbour development, and resources survey. A programme on underwater archaeological exploration along the Indian coast in collaboration with the Archaeological Department of the Tamil Nadu government and Indian National Science Academy was also started.

One hundred and twenty-five research papers, besides a number of technical reports, were published. □

Small-Capacity Ferrocement Water Tanks

The Structural Engineering Research Centre (SERC), Madras, has brought out a brochure on ferrocement water tanks which this laboratory has developed. Designs for 800-, 5000-, 7500- and 10,000-litre capacity tanks have been developed. For an individual residential unit, a single tank (rectangular/cylindrical) of 800-litre capacity has been recommended; for blocks of flats, multiple tanks with compartments of about 800-litre capacity each; and for community uses, single or multiple (interconnected) tanks (cylindrical) of 5,000- or 10,000-litre capacity each have been designed. The ferrocement tanks, according to the brochure, result in a saving of 40% in comparison with the traditional, brick-walled tanks.

The brochure (compilers: E. Abdul Karim and G. Paul Joseph) may be obtained (free of cost) from: The Director, SERC, Madras 600 113. □

PERSONNEL NEWS

Appointments Promotions

SHRI V RAMACHANDRAN

Shri V. Ramachandran of Indian National Scientific Documentation Centre (INSDOC), New Delhi, has been merit-promoted as Printing Officer EI (31 March 1983).

Retirements

SHRI A KRISHNAN

Shri A. Krishnan, Scientist EII, INSDOC, New Delhi, has retired (31 March 1983).

Shri Krishnan was Scientist in charge of INSDOC from 5 June 1978 to 3 December 1981.

* * *

Shri N. K. Jain, Senior Finance & Accounts Officer, and Shri Hira Lal, Private Secretary to Chief Editor, Publications & Information Directorate, New Delhi, have retired (31 March 1983). □

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PM stresses urgent need to issue guidelines for implementing Technology Policy

Presiding over a meeting of the Society of Council of Scientific and Industrial Research in New Delhi on 13 April 1983, the Prime Minister Smt. Indira Gandhi said that guidelines had to be issued for implementing the nation's Technology Policy, which she had announced during the recent session of the Indian Science Congress Association held at Tirupati in January this year.

Referring to the Karimnagar rural development project undertaken by CSIR in early 70s, the CSIR President felt that the programme could be extended to other backward rural areas also. "If we want to make up for lost time, we must not only create new technology rapidly but also use it and take it to the rural areas", she added.

Whether it was necessary to go through all the stages or whether one could jump over them and provide the latest technology to the backward areas, was the crux of the problem, she pointed out. Some attempts were being made in Lakshadweep Islands to utilize solar and wind energy, desalination technology, and improved techniques for development of fisheries, she said.

Concerned about the lack of coordination between government departments and municipalities, which came in the way of extension of benefits of science and technology to the masses, the Prime Minister had directed the Cabinet Secretary to examine how these could be better coordinated. CSIR would have a useful role to play in such efforts, she assured the Council's scientists.

The Prime Minister also stressed the importance of more linkages, not merely between research and industry but also between research and users. The Science Advisory Committee to the Cabinet was seized of this matter.

Earlier, in his welcome speech, Prof. S. Nurul Hasan, Vice President of CSIR, referred to the urgency of having guidelines for implementing the Technology Policy. He also spoke of the need for implementing the recommendations of the working group on science and technology in regard to flow of funds from economic ministries and departments to national laboratories.

Referring to the need for linkages between industry and research, Dr G.S. Sidhu, Director General, Scientific & Industrial Research, said that it was not possible for the research system to define by itself national goals of large magnitude. The SACC had recommended that this could best be done by involving the industry and the research system. According to him, funds invested in R&D constituted a mere fraction of the total capital investment being made in industry. Much larger allocations were needed for pilot plants, process demonstration units, prototypes of machinery, equipment, and instruments. Such funds could be committed for the R&D system only if there was a political will to utilize the results of R&D. For example, a decision could be taken that large plants should be set up on the basis of complete indigenous know-how and engineering.

The Director General added that CSIR had already demonstrated its capability of providing know-how for plants in the investment range of Rs 50 million to Rs 250 million and could do so even for larger plants.

The latest development of technology in the field of microwave tubes came up for discussion when Dr M.S. Sanjeevi Rao, Union Deputy Minister of Electronics, informed the Society that steps were being taken to involve Bharat Electronics Ltd, Central Electronics Engineering Research Institute and the concerned defence departments in developing indigenous technology for some of the most sophisticated products. □

CIMAP's new building inaugurated

The newly constructed building of Central Institute of Medicinal and Aromatic Plants (CIMAP), Lucknow, was inaugurated by the President of India Shri Zail Singh at a function held on 3 April 1983.

In his address the President said that India was one of the few centres of civilization in the world where medicinal plants were used on the basis of a well-developed system of medicine called Ayurveda—a system that took care of

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basic health needs. Continuing, he said: "Ours has also been the home of perfumes and flavours." More than 2000 years ago this country could boast of a well-organized perfumery and flavour industry. In many old historical accounts one finds reference to the flourishing trade the country had in the export of spices and exotic commodities like sandalwood, sandalwood oil, rose water, and rose oil, he added. Stating that modern medicine had benefited people in a number of ways, the President, however, cautioned that indiscriminate use of modern synthetic drugs, though effective in providing quick relief, caused many side effects. Even in developed countries there was a growing reluctance to use them now and a new urge was growing : to take recourse more and more to herbal drugs. In this context he referred to the huge monies being spent in USA every year on research and development in herbal and other plant-based drugs. The President also suggested that Indian scientists develop people-oriented technology.

Congratulating this CSIR laboratory on its achievements in medicinal and aromatic plants, he made special mention of its survey work in tribal areas to find profitable medicinal plants which may be beneficial to the people of that area.

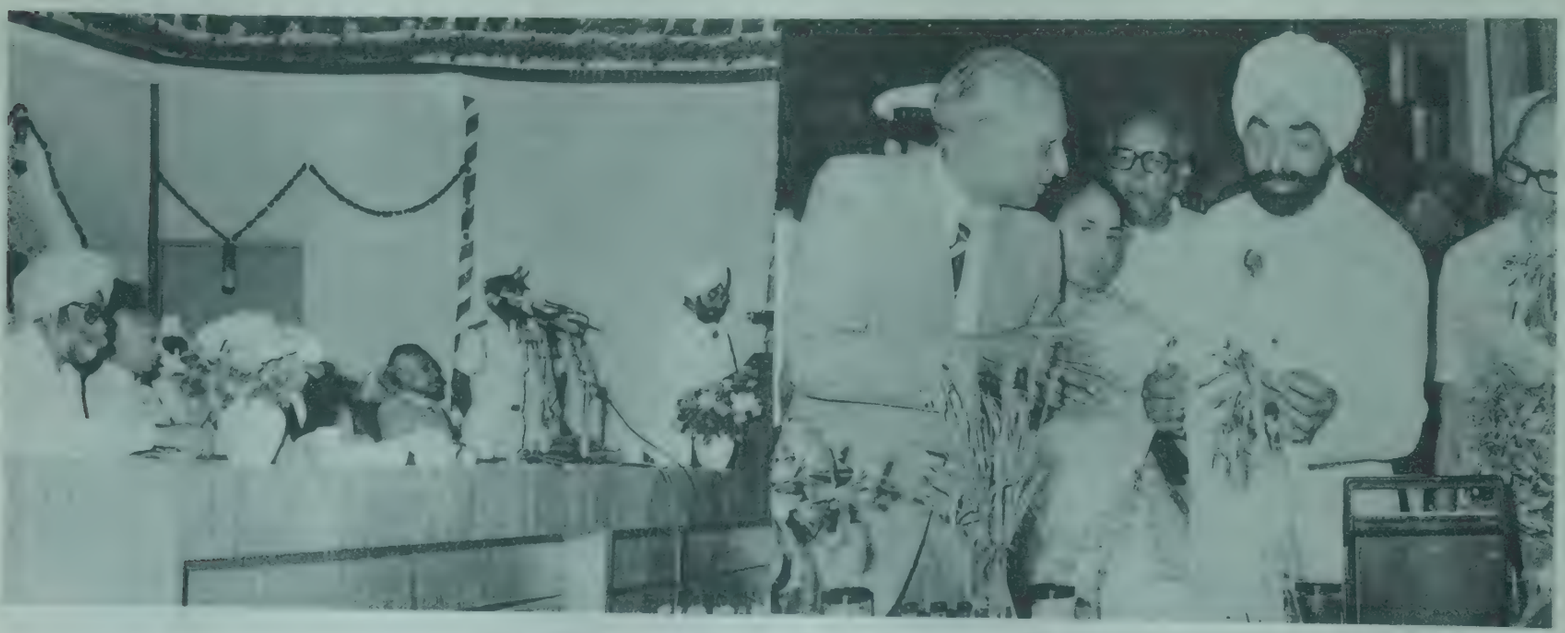
The President also released a monograph on Opium Poppy as well as two superior strains of peppermint and spearmint which the institute had evolved. Taken round the exhibition on medicinal and aromatic plants and their products, Shri Zail Singh showed interest in its research projects. He also unveiled a plaque of the laboratory.

Welcoming the President, Uttar Pradesh's Chief Minister Shri Sripati Misra and other guests, Dr G.S. Sidhu, Director General of CSIR, said that it was a matter of great privilege to the Council that CIMAP laboratory was being dedicated to the nation by the President of India.

Dr Akhtar Husain, CIMAP's Director, gave a resume of the history and activities of the institute, which was set up in 1959 under the name Central Indian Medicinal Plants Organisation. During the first 15 years of its life, a number of exotic medicinal and aromatic plants had been introduced for the first time in the country, he said. These included Japanese mint, pep-permint, spearmint, bergamot mint, geranium, patchouli, Java citronella, ergot of rye, and belladonna. Cultivation techniques had also been developed for indigenous plants like lemongrass, palmarosa, and pyrethrum, some of which have had a major impact on essential oil and pharmaceutical industries.

The institute was renamed Central Institute of Medicinal and Aromatic Plants in July 1977 in keeping with its wider range of activities. The institute had now its own campus with well-equipped laboratories and pilot plant-cum-workshop, as also a chain of regional centres in different agro-climatic zones of the country.

Some of the significant pieces of work which the CIMAP Director mentioned related to the development of superior strains of peppermint and spearmint for large-scale commercial cultivation and superior selection of Japanese mint, lemongrass, palmarosa and opium poppy and high alkaloid containing strains of ergot. Two tropane-yielding plants, namely Australian *Duboisia* and



In the photograph on left, the President of India, Shri Zail Singh, is seen addressing the gathering at the inauguration function of CIMAP's buildings. Seated on the dais (from left) are: Dr G.S. Sidhu, Director General, CSIR; Shri Sripati Misra, Chief Minister of UP; and Dr Akhtar Husain, Director of CIMAP. The photograph on the right shows Dr Husain explaining to the President the exhibits on aromatic and medicinal plants.

Egyptian henbane, had also been introduced and brought into commercial cultivation. Other important essential oil-bearing plants taken up for selection/improvement were, for example, lavender and clary sage. Dr Husain also mentioned the recent achievements in rose oil production with modern technology developed by the institute. The institute had already taken up its utilization in Hasayan block, Aligarh, he added.

Dr Husain also outlined the future research programmes and projects, which, he said, would go a long way in improving agrotechnology of various essential oil-bearing plants and medicinal plants. □

CECRI—Industry Get-together

A get-together which Central Electrochemical Research Institute (CECRI), Karaikudi, had organized with electrochemical industries in Kerala state at Cochin on 16 February 1983 was helpful in familiarizing the industry with the achievements of the Karaikudi laboratory and in assessing the R&D needs of the electrochemical industry in the state. The CECRI scientists highlighted the activities of the laboratory through presentation of papers, in the areas of its activity, namely inorganic and organic electrochemicals, electrothermal products, corrosion control, high-energy density battery systems, electroplating and electrofinishing, hydroelectrometallurgy and solid-state electrochemistry, including solar energy absorbing materials.

In answer to the specific problems posed by industries' representatives, the get-together suggested some solutions. Some of them:

The institute could take up cathodic protection of cables and corrosion control of the cooling water system for Fertilizers & Chemicals Travancore Ltd (FACT), Alwaye. In regard to quality control in hard chromium plating, the institute would get in touch with concerned industrial units. Graphite substrate lead dioxide electrode, it was recommended, should be standardized at CECRI.

A marine corrosion control section and a quality control section devoted to electroplating should be started at CECRI's Cochin unit in collaboration with Central Institute of Fisheries Technology and Mechanical Engineering Research and Development Organisation respectively. Also, a section on anodizing and colouring, it was suggested, should be started at the unit. Industry could sponsor at CECRI any project concerning their water treatment problems. It was also suggested that the know-how developed by CECRI should be made available to the Technology Development Centre of Kerala.

Speaking at the get-together, the CECRI Director Dr K.S. Rajagopalan said that materials worth more than Rs 20,000 million were being produced in India through electrochemical and electrothermal processes. One of the reasons for holding the get-together in this state, according to him, was the surplus power position. Calcium gluconate, misch metal and perchlorate were being produced in the state through CECRI know-how.

Shri K. Gopinathan, Director of Small Industries Services Institute, Trichur, who presided, was hopeful that the get-together would help bridge the gap between research and industry.

Inaugurating the meet, Shri P.N. Menon, General Manager of FACT (Cochin Division), mentioned that several tens of millions of rupees could be saved by disseminating information relating to corrosion control. He urged the scientists of the Cochin laboratory to visit the industrial units in the state to identify their problems. □

NBRI's get-together with betel-vine growers

A get-together of betel-vine growers and scientists of National Botanical Research Institute (NBRI), Lucknow, made an appraisal of *pan* (betel-vine) cultivators' problems and this CSIR laboratory's efforts to solve them. Held at Mahoba on 12 February 1983, the meet was organized by NBRI in collaboration with Bundelkhand Vikas Parishad (BVP) of Uttar Pradesh. Some 600 betel-vine growers from Mahoba (UP), Gwalior and Chattarpur districts (Madhya Pradesh), scientists from NBRI and Betelvine Research Station, Chattarpur, and district officials attended the get-together.

The results achieved by the cultivators through adoption of improved agricultural techniques recommended by NBRI were highlighted by BVP's secretary Shri S. Chaurasia, who also emphasized the need for continuing the scheme at Mahoba to sustain the growers' interest in the improved agricultural practices.

Speakers appreciated this CSIR laboratory's efforts in providing solutions to their problems. They also urged the growers to avail themselves of the technical advice and help rendered by NBRI, and also to keep their conservatories hygienic.

Dr J.K. Maheshwari, NBRI's Scientist in charge, apprised the participants of the progress of research on various aspects of betel-vine culture carried out in his laboratory. He also mentioned the measures developed for controlling diseases and pests of *pan*, besides the complete technology developed for storage of betel leaves in order to get remunerative prices for the crop.

Shri S.P. Gaur, District Magistrate, Hamirpur, who presided over the function, commended NBRI for its work in improving betel-vine cultivation, which was evident from a spontaneous response from the growers to adopt the improved agro-techniques.

In his address, Shri J.N. Ranjan, Commissioner of Jhansi Division, spoke of Mahoba's pre-eminent position in the betel-vine industry and assured the growers of government's aid to improve the lot of the *pan* growers. The state government had decided, he added, to offer two hectares of land to NBRI on

Mahoba-Charkari Road for establishing an experimental-cum-demonstration betel-vine conservatory and a field laboratory.

For more information on the topic, see *CN*, 30(1980), 57; 31(1981), 91. □

Cassava for alcohol production

A viable technology for the production of alcohol from cassava (*Manihot esculenta = utilissima*) is available within the country, observed the participants at a seminar held at Regional Research Laboratory (RRL), Trivandrum. The work of Central Food Technological Research Institute, Mysore, Central Tuber Crops Research Institute, Trivandrum, and Vikram Sarabhai Space Centre, Trivandrum, testified to the conclusion. The seminar, held 2 December 1982, was jointly sponsored by Association of Food Scientists and Technologists (India)—Trivandrum Chapter, Kerala's State Committee on Science and Technology, and RRL-Trivandrum.

Currently alcohol is produced in India mainly from molasses. Kerala has to depend for molasses on neighbouring states as her production of cane-sugar is negligible. The state being the major producer of cassava, to the extent of 80% of the country's total production, the crop's utility for production of alcohol has a fair chance of success without the food needs of the people being affected.

The participants also observed that the use of alcohol as a chemical feedstock would be more relevant. They also called for greater R&D efforts in regard to fermentation processes, viz. continuous and vacuum, cell immobilization and improvement in yeast strains. A demonstration plant with technology developed in the country may be set up with financial assistance from government agencies. Joint ventures for production of alcohol may be envisaged, the seminar felt, with other countries like Thailand, Nigeria, and Ghana where cassava production is less expensive. □

CIMAP's exhibition on medicinal plants and PID's on publications

An exhibition on medicinal plants and their products, used in modern and indigenous systems of medicine, was organized by Central Institute of Medicinal and Aromatic Plants (CIMAP), Lucknow, from 23 to 25 March 1983 at Ashok Hotel, New Delhi. The occasion was an international seminar on Medicinal Plants, Phytochemicals and Bulk Drugs, sponsored by the Basic Chemicals, Pharmaceuticals and Cosmetics Export Promotion Council (CHEMEXCIL), India.

The exhibition was inaugurated—as was the seminar—by Smt. Ram Dulari Sinha, Union Minister of State for Commerce. The minister, who evinced great interest in the exhibits, appreciated CIMAP's work in medicinal and aromatic plants.

Also organized on the same occasion was another exhibition—that of books and periodicals relevant to the theme of the seminar. This exhibition, also inaugurated by the minister, was put up, among others, by Publications & Information Directorate (PID), New Delhi.

* * *

CSIR's participation in the seminar

Scientists from five CSIR laboratories contributed to the success of the seminar through presentation of papers. The CSIR scientists included Dr Akhtar Husain (CIMAP), who made a scientific appraisal of medicinal plants; Dr C.K. Atal (Regional Research Laboratory-Jammu), whose lecture related to potential of newer medicinal plants; Shri Y.R. Chadha (PID), who dealt with information sources and services on medicinal plants and drugs; Dr Nitya Nand (Central Drug Research Institute), who delivered the keynote address on world trends and advances in synthetic drugs; and Dr A.V. Rama Rao (National Chemical Laboratory), whose talk was devoted to developments of potential synthetic drugs. □

NCL technology-based analgesic Ibuprofen to be commercially produced

The National Chemical Laboratory (NCL), Pune, has developed a process for the preparation of Ibuprofen, one of the widely used analgesic and antiinflammatory drugs. Developed for the sponsor CIPLA, Bombay, the process is based on an innovative technology different from the one presently employed by a multinational company in the country. CIPLA, which has successfully carried out pilot-plant production of this drug, is expected to commence commercial production (one tonne/month) by December 1983. The annual turnover of the production would be worth around Rs 13 million. The present demand for the drug is around 40 tonnes per annum, which is expected to go up to 100 tonnes by the end of the current plan. □

Mobile reverse osmosis desalination plant

The prototype of a mobile reverse osmosis desalination plant of 10,000-litre per day capacity was inaugurated at Central Salt & Marine Chemicals Research Institute, Bhavnagar, by the Governor of Gujarat, Smt. Sharda Mukherjee, on 31 March 1983. The purpose of the mobile unit, which can be taken to villages and operated for 2-4 weeks, is to create awareness among the local people of technological solutions to the drinking-water problem. □

Light-weight bricks from coconut pith and clay

The Regional Research Laboratory, Trivandrum, has studied the performance of light-weight bricks which it has prepared by mixing coconut pith/shell powder/saw-dust and rice husk in various proportions with Cannanore clay and fire clay, and machine pressing. The dry-pressing method was used as the normal wet-pressing did not yield good results. The bricks made of

common clays with coconut pith showed poor strength and high porosity. However, the bricks made of common clay with pith of 30 mesh and above showed better performance. □

Zooplankton and environmental studies in Bombay waters

The waters around Bombay coast have different ecological niches—polluted and unpolluted. With a view to assessing the fisheries potential of these waters, Shri S.N. Gajbhiye of National Institute of Oceanography (NIO), Dona Paula, Goa, has studied the ecology of the zooplankton of the waters. The researcher chose three transects, viz. Versova, Mahim, and Thana creak, for the study. Some of the salient findings of the study:

The physico-chemical conditions in these waters indicate the adverse effects of pollution: change in ecosystem which in turn has influenced the quantitative and qualitative distribution of zooplankton. The environmental parameters studied were dissolved oxygen, salinity, phosphates, and nitrates.

The zooplankton in the nearshore waters was quite rich, particularly during flood tide, showing the tidal influence on the distribution of zooplankton. The results of the diurnal variations confirmed the influence of environmental parameters on the distribution and abundance of zooplankton in the nearshore waters.

Groupwise distribution showed dominance of copepods at all stations. Seventy-four species of copepods were identified. Other groups were decapods, chaetognaths, mysids, medusae, ctenophores, and polychaetes.

Experimental studies to determine the tolerance limits of some zooplankton showed that mercury was the most toxic element, followed by copper, arsenic, chromium, lead, and zinc. Concentrations of trace metals like copper, cobalt, manganese, and cadmium in zooplankton varied widely.

The dumping of large quantities of domestic and industrial wastes into the creaks and nearshore waters, the study has shown, has led to the formation of local pockets of pollution. As a result, ecology of the area has been found to be adversely affected, only sturdy organisms being able to survive. The experimental data were correlated with field observations, and the polluted and unpolluted waters delineated.

Shri Gajbhiye, who carried out the study under the guidance of Dr B.N. Desai of NIO's regional centre at Bombay, was awarded Ph.D. degree of University of Bombay. □

Synthesis of terpenoids and applications of Diels-Alder fragmentation reaction

The fragmentation of homoallylic and homobenzylic alcohols with lead tetraacetate has been shown to be a convenient route for the synthesis of aldehydes. The researcher is Shri K. Shankaran of National Chemical Laboratory (NCL), Pune.

The fragmentation of isopulogeol was achieved by heating it in benzene with lead tetraacetate. 6-Acetoxy-3,7-dimethyloct-7-en-1-al thus synthesized was transformed to (i) 3,7-dimethyl-6-oxooctanoic acid, a constituent of geranium oil, and (ii) 6-acetoxy-3,7-dimethyloct-7-enoic acid. The acetoxy acid on oxidative decarboxylation with lead tetraacetate furnished 2,6-dimethyl-1,6-heptadien-3-yl acetate, which was recently synthesized through a different route by Mori who showed that the dimethyl heptadienylacetate is half as active as the pheromone of Comstock's mealy-bug. The latter is one of the pests of apple, pears, and other crops. Several analogues of the mealy-bug pheromone have been synthesized. A possible biogenetic route for the pheromone has been suggested, according to which 3,7-dimethylocta-2,6-dienoic acid is oxidized to 6-hydroxy-3,7-dimethylocta-2,7-dienoic acid, which undergoes cyclization via intramolecular Michael addition to furnish a tetrahydrofuran derivative. Decarboxylation of the tetrahydrofuran derivative followed by acetylation and double-bond migration would lead to the pheromone.

An alkyl halide R-X could be transformed to an aldehyde R-CH_2-CHO having two additional carbon atoms based on the following transformations. Methyl 3-oxo-4-phenylbutanoate was reacted with the alkyl halide R-X in the presence of sodium hydride-benzene to furnish the alkylated β-ketoester which was hydrolyzed to the corresponding benzyl ketone. Reduction of the benzyl ketone with sodium borohydride and fragmentation of the resulting homobenzylic alcohol furnished the aldehyde RCH_2CHO.

The researcher also worked out a convenient route for the synthesis of aromatic aldehydes. In this, the aromatic compound is acylated with phenylacetic acid. The resulting benzyl ketone is reduced with sodium borohydride to furnish a homobenzylic alcohol which is subjected to fragmentation reaction.

The preparation of an aldehyde R-CHO from the corresponding acid R-CO_2H is a useful transformation in synthetic organic chemistry. When an ester R-CO_2CH_3 is reacted with excess benzyl magnesium chloride it furnishes a tertiary alcohol, which on fragmentation gives the benzyl ketone. Reduction of the benzyl ketone and subsequent fragmentation furnish the aldehyde R-CHO. This route was employed for the preparation of several aromatic and aliphatic aldehydes.

p-Mentha-$\Delta^{3,8(9)}$-diene was condensed with ethyl acrylate. The Diels-Alder adduct was saponified and the oxidative decarboxylation of the resulting acid was studied. The Diels-Alder reaction of the menthadiene with vinyl acetate was also examined.

Shri Shankaran, who carried out the studies under the guidance of Dr A.S. Rao of NCL, was awarded Ph.D. degree by Poona University for his thesis based on the study. □

FRG delegation visits CFRI

A delegation consisting of four engineers and technologists from FRG, and engineers from Bharat Heavy Electricals Ltd, visited Central Fuel Research Institute (CFRI), Dhanbad, on 24 February 1983. The German delegation comprised Prof. Dr Ing. Ekkehard Weber, Dip-Ing. Willy Meyer, Dr Ernst J.K. Beschorner, and Dip.-Ing. Wenzel von Jordan. The purpose of the delegation was to explore the possibilities of identifying areas of cooperation between the governments of the two countries in power generation, particularly fluid-bed combustion and its link-up with dual-cycle generation of power.

Dr Meyer described his organization (Geschaftsfuhrer, Saarberg Interplan, Stengelstrabe) as the second biggest mining company in Germany and that they were particularly interested in the mining of non-coking coal, one-third of which is utilized for power generation in the three thermal power plants of the company. All these plants are based on PF firing system and the capacity of the smallest unit is 7 MW and of the biggest, 750 MW—the biggest coal-based thermal power plant in Europe. Dr Meyer referred to the utilization of rejects from the flotation cells, used for upgrading coal, in a test plant of 6 MW capacity, employing the fluid-bed combustion technique. A 200 MW unit, based on fluid-bed combustion technique and utilizing flotation tailings, was stated to be the first commercial unit of its kind for power generation with combined cycle process under atmospheric pressure. The two units of 100 MW are connected with a hot air gas turbine. The commercial unit uses the same techniques for feeding, combustion system, ash removal, etc. as were developed in the test plant with coal, middling, rejects, etc. as feed materials.

Dr Beschorner represented a company (Fachbereich Energietechnik) manufacturing boilers and other components for large thermal power plants. The company also carries out desulphurization of coal on a large scale.

Dr Jordan, representing Lurgi Umwelt und Chemotechnik GmbH, discussed the possibilities of supplying gas clean-up equipment like electrostatic precipitators, filters, and scrubbers of various capacities working on different pressures (up to 200 atm., at 800-950°C).

Shri M.M. Sen and Shri M.N. Juneja, of CFRI, presented resumé of their institute's activities on fluid-bed combustion and gasification. Other CSIR scientists who presented resumé of their respective organizations were Shri A.B. Dutta of CMERI, Durgapur, and Shri S.M. Dutta of RRL, Jorhat.

According to Prof. Weber (Institut fur Mechanische Vertahrenstechnik), opinion on pressurized fluid-bed combustion in West Germany was still divided. □

CONFERENCE BRIEFS

ASCA SEMINAR ON INTERNATIONAL R&D COOPERATION

Shri K.N. Johry, head of the International Scientific Collaboration Division of CSIR, attended the ASCA (Association for Science Cooperation in Asia) seminar on International Research and Development Cooperation held in Tokyo, 2-5 March 1983. Other countries which participated in the seminar were Australia, Korea, Indonesia, Philippines, Thailand, and China.

Shri Johry, who participated in a panel meeting concerned with the present status of international R&D cooperation, presented a country report on national R&D policy and its measures, international R&D cooperation and difficulties in promoting international cooperation, and measures for promoting institutional R&D. The Indian paper, presented by the CSIR scientist, also summed up the Indian experience; furthermore, it assessed the regional collaborative projects and suggested measures for promoting ASCA collaboration.

The recommendations made to the next ASCA conference for strengthening ASCA regional cooperation and regional programmes were: (i) Areas of common interest among countries in ASCA region be examined to enhance R&D cooperation and to increase the level of scientific and technological capability; (ii) A coordinating mechanism at regional level be considered for monitoring the planning and implementation of ASCA regional projects (involving more than two countries); and (iii) A modest funding mechanism be also considered to achieve this objective. □

DEPUTATION BRIEFS

At the invitation of the Economic and Social Commission for Asia and Pacific (ESCAP) Prof. C.G. Swaminathan, Director, Central Road Research Institute (CRRI), New Delhi, led a four-member Indian delegation to the international workshop on Non-motorized Transport, held at Bangkok from 8 to 14 March 1983. The CSIR scientist, who was chairman of the workshop, reports that the modified bullock-cart developed by CRRI was airlifted by ESCAP for display. Also, a CRRI's film on rural roads was screened. □

PERSONNEL NEWS

Dr C.R. Krishna Murti retires

Dr C.R. Krishna Murti, Director, Industrial Toxicology Research Centre (ITRC), Lucknow, laid down office on attaining superannuation on 31 March 1983 after a distinguished career.

First among a few scientists recruited in 1950 for establishing what is now Central Drug Research Institute (CDRI), Lucknow, Dr Krishna Murti, during his 25 years' association with that institute, rose from the rank of Junior Scientific Officer to that of Deputy Director; he was also among the first to be merit-promoted. Dr Krishna Murti's accomplishments include the establishment of a dynamic school of

biochemistry. Besides fruitful attempts to unravel the mode of action of antibiotics, his school has made handsome contributions towards the understanding of the biochemistry of pathogenic microorganisms causing cholera, typhoid, plague, and tuberculosis. It has developed, for example, a number of viable biotechnology-based processes for recycling animal, agro and hospital wastes and producing therapeutically useful products. In applied

DR C.R. KRISHNA MURTI

biochemistry, Dr Krishna Murti addressed himself to the utilization of agricultural wastes, slaughterhouse byproducts and distillery sludges for preparing culture media, protein hydrolysates, vitamin concentrates, etc. His team has set up pilot units for extracting immunoglobulins from human placentae and human plasma and standardized methods for formulating the blood fractions for human use. Furthermore, the technology has been transferred to production units. His expertise in this area has been availed of by the Ministry of Defence and Indian Council of Agricultural Research, besides CSIR, to set up blood fractionation units and pilot plants for recovering pancreatic insulin from animal glands, and γ-globulin and albumin from outdated human plasma and placentae.

Moving over to ITRC in 1975, Dr Krishna Murti became its Director in 1978. Reorienting the activities of this laboratory, he succeeded in making it respond to national needs of helping attain an optimum standard of health and safety of the working and living environment. Under his stewardship this CSIR laboratory has developed expertise in testing the safety of industrial chemicals and pesticides for registration. He has also established an ecosystem-cum-laboratory complex.

Among the many honours he has received are: fellowship of Indian National Science Academy (1971); ICMR's Basanti Devi Amir Chand Award (1973); INSA's Dr Sunder Lal Hora Medal (1981); and UGC's National Professorship (1976-77). He is chairman of the working group, constituted by the Department of Environment, for coordinating ecodevelopmental research activities in Ganga Basin and principal coordinator of the integrated environmental programme on heavy-metal pollution. He has to his credit 200 original papers, a number of monographs and chapters in books, some of which he has edited also. Over 60 researchers have obtained doctorates under his guidance. He has also contributed to improving the quality of scholarly periodicals, as member of editorial boards of several journals, which include *Indian Journal of Biochemistry and Biophysics*, *Journal of Scientific & Industrial Research*, and *Journal of Biosciences*. □

Dr G.B. Singh appointed ITRC Scientist in charge

Dr G.B. Singh, Scientist F, of Industrial Toxicology Research Centre (ITRC), Lucknow, has been appointed Scientist

DR G.B. SINGH

in charge of this laboratory (1 April 1983) consequent on the retirement of Dr C.R. Krishna Murti.

Dr Singh (born 29 July 1927) obtained his M.B.B.S. (1952) and M.D. in physiology (1959) from K.G.'s Medical College, Lucknow. He joined Central Drug Research Institute, Lucknow, in December 1956, where he carried out studies on the etiology, pathogenesis and therapy of peptic ulcer. In 1966 he moved over to ITRC to help establish this centre.

At ITRC, Dr Singh has carried out extensive studies on toxicity of synthetic dyes and dye intermediates. He and his coworkers have found ascorbic acid to be useful in partially controlling the benzanthrone-induced hyperpigmentation in workers. His studies on kinetics of uptake of benzanthrone by skin have led to the development of an ointment for external use.

Dr Singh's research interests include the study of harmful effects of synthetic colours used in foodstuffs.

He has also conducted toxicological studies on a number of new chemicals and compounds, and served on several committees concerned with food standards.

A member of several learned and professional societies like Royal College of Pathologists (London), Society of Biological Chemists (India), and Society of Toxicology (India), Dr Singh has more than 90 papers, besides many technical reports, to his credit.

DR P.V. SANKER NARAYAN

Dr P.V. Sanker Narayan, Scientist EII, of National Geophysical Research Institute (NGRI), Hyderabad, has been promoted as Scientist F (10 March 1983).

Dr Narayan (born 5 Aug. 1923) had his early education in Kerala and took his B.Sc. degree (1943) from Madras University. After working with India Meteorological Department from 1944 to 1956 he was till 1962 with Wisconsin University, USA. Here he took his M.S. (physics) (1958) and Ph.D. (geology and geophysics) (1961) degrees and taught for a short while. At Wisconsin, he adapted the then newly developed nuclear precession magnetometer for

operation from air and carried out an aeromagnetic survey of that state.

On his return to India in 1962, Dr Narayan joined CSIR as Pool Officer and was subsequently appointed Senior Scientific Officer at NGRI. Here he built up the Geomagnetism and Geoelectricity Division and set up magnetic observatories, one at Hyderabad and another nearby. In

DR P.V.SANKER NARAYAN

1975, under an Indo-Soviet scientific collaboration project, he established an equatorial observatory near Etaiyapuram (Tamil Nadu). Merit-promoted as Scientist EI in 1966, he rose to Scientist EII position in 1975.

One of Dr Narayan's major contributions in applied geophysics is the setting up, at NGRI, of a multi-parameter airborne geophysical surveying system as a national facility, which involved designing and fabricating a variety of specialized equipment.

Dr Narayan has won the Decennial Award of Indian Geophysical Union for his contributions to the development of airborne geophysics in India.

The principal investigator from the Indian side of the Indo-Soviet scientific collaboration project on micropulsation studies, Dr Narayan has also been contributing to experimental studies on the effects of pulsating electromagnetic field on human physiology. He has served as vice president of Indian Association of Biomedical Scientists. Has more than 70 papers to his credit. □

Honours & Awards

Dr B. Singh, Director, CMRS, Dhanbad, has been elected president of Flameproof and Intrinsic Safety Society of India. He has also been elected president of Indian Society of Rock Mechanics and Ground Control. □

DR LATA SINGH APPOINTED JOINT SECRETARY (ADMINISTRATION)

Dr Lata Singh, formerly Secretary to the Government of Uttar Pradesh in the Department of Medical Health and Family Welfare, has been appointed Joint Secretary (Administration) of CSIR (7 April 1983).

An M.A. in mathematics from University of Delhi and a Ph.D., also in

DR LATA SINGH

mathematics, from Indian Institute of Technology-Delhi, she joined the Indian Administrative Service in 1961. Having taught for about three years in a women's college in Delhi, she entered the U.P. cadre of IAS. Dr Lata Singh has wide experience in economic and social services, having worked in several departments at the Centre and U.P. government. One of her assignments was with the Centre's Department of Chemicals & Fertilizers where she acquired rich experience of the nature demanded of her present assignment. □

Management Development Centre shifts to CSIR Complex

The Centre for Management Development in R&D of National Institute of Science, Technology and Development Studies has shifted from CSIR Headquarters to CSIR Complex, NPL Campus, Hillside Road, New Delhi 110012. (Telephone 566102). □

ANNOUNCEMENTS

International Symposium on Biotechnology

The seventh international symposium on Biotechnology, sponsored by IUPAC's Biotechnology Commission and cosponsored, among others, by CSIR, will be held from 19 to 25 February 1984 at Indian Institute of Technology, New Delhi. Twenty invited plenary lectures, covering the status of as many areas, followed by related poster sessions, will comprise the programme. Some of the topics which the symposium will discuss are: recombinant DNA technology; growth kinetics; mass cultivation of algae; microbial production of liquid and gaseous fuels; biometallurgy; hybridoma technology; immobilized enzymes, cells and organelles; microbial transformations; and process engineering and optimization. One of the important topics included in panel discussions concerns the status of and directions of biotechnology in the Third World.

Deadline for the receipt of abstracts (for poster sessions) is 31 *July* 1983, and for the receipt of registration forms, 31 *October* 1983. Registration forms and further information regarding the symposium obtainable from: The Secretary, VII International Biotechnology Symposium, C/o Biochemical Engineering Research Centre, Indian Institute of Technology, Hauz Khas, New Delhi 110016. □

COUNCIL OF SCIENTIFIC & INDUSTRIAL RESEARCH

The Council proposes to appoint two Scientists F (scale of pay Rs 2000-125/2-2500 or 2250-125/2-2500-EB-125/2-2750), one each at National Institute of Science, Technology & Development Studies (NISTADS), New Delhi, and Central Drug Research Institute (CDRI), Lucknow. The respective discipline/area and the deadline for sending curriculum vitae are:

(i) Post at NISTADS (Advt. No. 6/83): Socialization of scientific and technological developments, planning of science and technology, and study of the impact of science on society—15 *June* 1983.

(ii) Post at CDRI (Advt. No. 8/83): Fermentation technology—22 *June* 1983.

Further details and prescribed pro forma for sending the curriculum vitae obtainable from: The Joint Secretary (Administration), CSIR, Rafi Marg, New Delhi 110001. □

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CSIR – INDUSTRY GET-TOGETHER

Against the background of India's Technology Policy, which the Prime Minister placed before the nation in January this year, CSIR is committed to implementing it in all its different aspects. At the heart of the policy are two objectives, namely (i) development of indigenous technology and (ii) efficient absorption and adaptation of imported technology, which would be of principal concern to this premier research council. In particular, CSIR seeks to meaningfully enlarge the horizon of interaction with industry. With a view to projecting the diversity and the range of competence and capabilities available in the CSIR network of laboratories, the Council organized a get-together with representatives of industry on 21 April 1983 at Vigyan Bhavan, New Delhi.

Shri N.D. Tiwari, Union Minister of Industry, in his inaugural address, said that it was a matter of pride that in a large number of fields, India is in a position to offer appropriate technology to other developing countries. The S&T structure in the country had reached, he said, a level to assist in the assessment and unpackaging of imported technology. What was reassuring to scientists and technologists in particular was the industry minister's assurance that free import of technology would not be allowed, and imports of technology would be permitted *only* on a selective basis.

The minister recalled with pride the words of Dr Vikram Sarabhai, the architect of India's space programme: "If we are to play a meaningful role nationally and in the community of nations, we must be second to none in the application of advanced technologies to the real problems of man and society." He called upon the two streams—the scientific community and the industrial community—to intermingle into one broad stream till their interdependence becomes an integral part of our way of life and thinking.

Making a reference to the paucity of technological information on the Indian industrial scenario, the industry minister made an important proposal—establishment of 'information centres' with links to internationally available sources of S&T information. This, he said, would greatly benefit medium and small industries in the private sector.

Shri Shivraj V. Patil, Minister of State for Science and Technology, urged the industry to help scientific institutions in the development of indigenous technology. He made it clear that mere importation of technology would not solve the country's problems unless we also planned for its absorption and adaptation.

Prof. M.G.K. Menon, Member (Science) of Planning Commission, explained that the Technology Policy covers not only the industrial sector alone but it also encompasses technology required for agriculture, health, rural development, and other sectors and areas. He wanted the participants from industry to candidly state their awareness of the capabilities of the country's S&T infrastructure and then decide whether or not indigenous technology was available.

Prof. S. Nurul Hasan, Vice President of CSIR, emphasized that the solution

At CSIR—Industry Get-together, the Council's Vice President Prof. S. Nurul Hasan (second from left) addressing the gathering. Others seated on the dais (from left) are: Dr G.S. Sidhu, Director General, CSIR; Shri N.D. Tiwari, Union Minister of Industry; Shri Shivraj V. Patil, Minister of State for Science and Technology; Prof. M.G.K. Menon, Member (Science), Planning Commission; and Dr V. Siddhartha, Adviser, CSIR.

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of the country's problems lies in the application of scientific knowledge to industry. In this task, design engineering and consultancy organizations had a major role to play. Prof. Hasan further stated that no foreign manufacturer would give us technology that would enable us to compete with them; hence efforts at indigenous development must proceed apaee, he emphasized.

Shri Ramkrishna Bajaj, Vice President of Federation of Indian Chambers of Commerce and Industry (FICCI), affirmed: "It is not that industry—even more, the private-sector industry—is a compulsive importer of technology, as is sometimes made out. In fact, public-sector companies in India are as much prone to technology import as private-sector companies." He was also of the view that India's R&D expenditure, which he quoted as Rs 8600 million in 1981-82, was not adequate for a country of India's size. Countries as small as Austria, Yugoslavia, and Belgium, the FICCI representative said, had larger outlays in absoiute terms. Shri Gurpreet Singh, Vice President of Association of Indian Engineering Industry, was critical of Indian industry's high-cost economy and called upon both research and industry to lower the costs.

Earlier, Dr G.S. Sidhu, Director General of CSIR, while welcoming the participants from industry and government departments as well as CSIR scientists, said that a get-together of CSIR with industry of such a dimension had taken place after a gap of nearly 18 years. CSIR, however, had plans to hold more frequent and intensive sector-wise and industry-wise meets, added the Director General. It may be mentioned that at CSIR constituents' level, periodic meetings with concerned industry have been helpful in the formulation of many of the constituent's R&D programmes.

An audio-visual programme, prepared by Central Electronics Engineering Research Institute, on some of CSIR technologies currently in use by industry exposed the representatives of industry to Council's solutions to some of the industry's technological problems.

The technical session consisted of four parallel, area-wise discussions relating to Chemicals & Chemical Engineering; Civil Engineering; Electronics & Instrumentation; and Engineering Disciplines other than the earlier three. Addressed by an industrialist who had successfully exploited a CSIR-generated technology, each session was followed by open-house discussions and framing of recommendations. The more significant of these.

- CSIR should strengthen its linkages and mechanisms of communication with industry.
- CSIR should critically evaluate the technology before releasing it to industry as well as ensure proper selection of entrepreneurs.
- Technology forecasting exercises should be undertaken jointly by CSIR and industry.
- A risk fund to finance the first user of an indigenous technology should be established.
- Where the need to import technology is established there should be a firm commitment for its absorption and continuous development, preferably in association with CSIR.

At a press conference, which concluded the one-day meet, the CSIR's Director General briefed a large number of their representatives on the objectives of the get-together and the outcome. As instances of CSIR's major technologies going into commercial production, Dr Sidhu mentioned electronic instrumentation for sugar industry and a range of pesticides. The acrylates plant for the Indian Petrochemicals Corporation Ltd coming up on the basis of NCL technology was, he said, so far the most sophisticated plant and also involved over Rs 250 million.

Dr Sidhu was appreciative of the constructive criticisms made by industry's representatives. He made it clear that the purpose of inviting industry was not just 'to get a pat on our back', but to receive valid technological and economic appraisal. And one of the important suggestions which, he said, would receive CSIR's attention was the avoidance of duplication of research effort. □

Recent Advances in Groundwater Exploration and Management

Some 30 papers and 120 delegates summed up the recent advances in groundwater exploration and management at a workshop held at National Geophysical Research Institute (NGRI), Hyderabad, from 27 to 29 January 1983. Sponsored among others by NGRI, the workshop had been organized by Indian Association of Geohydrologists (IAG).

While inaugurating the workshop Shri P. Shiv Shankar*, Union Minister of Petroleum and Energy, dealt with the progress made in the country in groundwater development. Describing the progress as a tremendous stride in the past three decades, the minister drew the attention of scientists and engineers to alternative energy systems such as solar energy, wind energy and biogas for tapping groundwater and the R&D efforts needed to develop tools suited to our climatic and development needs. Pointing out the relatively limited availability of groundwater as compared to the growing needs of water for irrigation systems, the minister underscored the need for developing computer-based management systems for optimal utilization of groundwater and surface waters without creating imbalances in the resources and environmental and ecological systems.

*Read out, in absence of the minister, by Dr I. Radhakrishna, organizing secretary of IAG

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Earlier, in his presidential address, Dr Hari Narain, president of IAG, and NGRI's Director†, called for sustained efforts in exploitation of groundwater resources with a scientific approach. Referring to the drought conditions, Dr Narain said that despite the implementation of big irrigation projects, many parts of the country faced drought periodically and about Rs 5000 million were being provided every year for temporary relief. The vagaries of nature could be countered only through large-scale exploration of groundwater resources, added Dr Narain. He further said that there was need to evolve the appropriate methodology in the eight geological provinces of the country.

Dr B.D. Pathak, Chairman of the Central Groundwater Board (CGWB), in his opening address, called for high priority for groundwater development in the existing command areas. It is far cheaper, he said, to exploit the groundwater resources than to conserve and utilize surface waters. Besides heavy expenditure in construction costs of dams to store water and of laying channels for irrigation these projects were getting inordinately delayed in their execution. On the other hand, there would be little burden on the public exchequer in the exploitation of groundwater, said Dr Pathak.

The workshop's deliberations spread over three technical sessions: Exploration for groundwater resources development; Groundwater evaluation techniques and approaches; and Groundwater management techniques and approaches. These were followed by a panel discussion on 'Drinking water supply in rural and urban sector'.

Technical Sessions

Dr B.D. Pathak, Chairman of CGWB, who also delivered the keynote address, emphasized the need for a detailed exploration for groundwater availability and its precise estimation for safe and optimum utilization. He felt the need for a major change in data collection, storage and processing systems and in planning/evaluation of groundwater resources.

Shri K.S. Srinivasan and Shri N. Varadaraj, of CGWB, were of the view that for achieving the maximum cost-benefit ratio in groundwater developmental schemes, a systematic approach based on landsat imageries and remote-sensing techniques coupled with aerial photo-interpretation, and geophysical data, should be adopted in the evaluation of groundwater resources.

Dr B.S. Rathor and Dr M. Poddar, of NGRI, who had conducted a study of tropical weathering by VLF/EMR measurements for groundwater exploration, described these methods as fast and inexpensive tools for mapping weathered layers in a crystalline hard rock area in tropical countries.

The spatial image-processing techniques for processing remotely sensed data to achieve better quality and accuracy were discussed by Dr A.D. Kulkarni of National Remote Sensing Agency.

Shri A. Raja Mohammed (AFPROGIFT, Hyderabad) and Prof. M.S. Vijaya Raghava (Osmania University) put forward an approach for computing aquifer parameters under a non-steady state condition for leaky and non-leaky confined aquifers. They also discussed the applicability and efficacy of this approach.

Dr I. Radhakrishna and Shri T. Gangadhara Rao of NGRI outlined the procedure for evaluating the chemical quality of different zones in an area and presented the results obtained by the use of self-potential and point-resistance logs for interpretation of selected individual zones for evaluating the groundwater quality.

Shri J.V.S. Murthy of CGWB, who had studied the radioactive, organic and chemical pollution levels through hydrochemical methods in the eastern precints of Hyderabad, suggested some immediate steps to improve the environmental conditions prevailing at present.

Shri B. Kumar and Dr I. Radhakrishna, of NGRI, reported the preliminary results of their study carried out in Marvanka Basin, Anantapur district, Andhra Pradesh. The deuterium distribution in soil moisture, groundwater and surface water under the semi-arid climatic conditions of the basin was established by the authors. Dr Ramesam, Dr K.C.B. Raju and coworkers of CGWB observed, in their studies, the deterioration in groundwater quality in many urban centres with increase in population density, especially in the absence of adequate waste disposal systems.

In their paper on groundwater flow in an inhomogeneous aquifer, Dr C.P. Gupta, Shri M. Thangarajan and others from NGRI discussed the finite element techniques.

The increase in chloride values (in groundwater) is proportional to the increase in the density of population, according to a paper presented by some CGWB's scientists.

Shri G. Krishna Rao (Geology Department, Andhra University, Waltair) presented a case study to show the relative positions of water table and piezometric surface in an area and the scope for success of dug-cum-bore wells. He also suggested the ideal size of a dug well for irrigation.

Dr A.K. Patni (District Groundwater Survey Unit, Khandwa, Madhya Pradesh) and Shri K.K. Chowdhury (Irrigation Department, Bhopal) reported a sharp decline of water table in the alluvial zone of Burhanpur block of Khandwa district owing to increased pace of groundwater exploitation.

At the valedictory session, Shri Naram Krishna Rao, Chairman of Hyderabad Metropolitan Water Supply & Sewage, referred to the imbalances in planning when he said that millions of rupees are spent to impound water but no efforts are made to avoid water wastage. He regretted the meagre budget allocation (to the tune of hardly

†since retired

4 to 5% of the total budget) to water resources development programmes in contrast to the rising populations in rural and urban areas and much publicized promises made towards safe drinking water supplies. □

CMERI develops portable solar cooking unit

A novel solar cooking unit has been developed by Central Mechanical Engineering Research Institute (CMERI), Durgapur. The unit has some characteristics which are distinct from those of solar cookers so far developed and marketed in the country.

Portable solar cooking unit developed by CMERI. Consists of a collapsible curved reflector mounted on a tripod stand which can be easily manoeuvred to track the sun. Takes less than two hours for cooking in winter and much less in summer.

The CMERI cooker consists of a collapsible, curved reflector (of about a meter diameter) mounted on a tripod light-weight stand. The reflector concentrates sun rays for cooking in a specially designed two-chamber pot. The stand can be manoeuvred to track the sun. The total height of the unit is about 1.5 m. The components of the unit are detachable and can be kept in a small kit. Hence the portability of the unit.

The cooker is suitable for small families for regular use as well as for occasional use as in camping. The gadget takes less than two hours for cooking in winter, and much less in summer. The cost including those of the cooking pot and the carrying case is about Rs 400. □

Sampling gun

In any metal-melting unit, small ingots are cast from which drillings are taken as samples for chemical analysis. This involves the danger of contamination. To get round this difficulty, Central Scientific Instruments Organisation (CSIO), Chandigarh, has designed and fabricated a sampling gun, a very simple and handy device for quick extraction of the metal in the form of wire in a refractory glass tube directly from the melting pot. Such wires can then be easily cut into small pieces to be used as samples for subsequent analysis, thereby avoiding any risk of external contamination. Also, provision has been made in the design to adjust the quantity of the extracted sample as required.

The know-how for the sampling device has been assigned to a firm for commercialization. □

CLRI offers a new textile auxiliary from tannery waste

A new textile auxiliary, designated as CASPROL-T, for use as a wetting, boiling and dye-levelling agent has been developed by Central Leather Research Institute (CLRI), Madras. This is considered a significant achievement as the process has a direct impact on the utilization of one of the largely available tannery wastes.

The process

Preparation of a colloidal protein from chrome shavings by hydrolysis forms the first phase of the development. The hydrolyzed protein thus obtained is incorporated into an indigenous non-edible vegetable oil at an appropriate step of the chemical modification of the oil during sulphonation. Because of the many specific reaction sites available both in the protein and in the vegetable oil, the ultimate product is anionic in nature, possessing surface-active, wetting, boiling, and dye-levelling characteristics.

The performance of the product as a wetting, boiling and dye-levelling agent in textiles has been evaluated in the textile-processing centres both in the public and in the private sectors. The treated yarn and fabric were assessed for their physico-chemical properties vis-a-vis conventionally processed yarn and fabric. The former possessed improved properties in regard to strength, feel and sheen of yarn. Other advantages of the product are that there is a considerable reduction in operational and chemicals costs, and, it being biodegradable, is a non-pollutant.

The team of scientists who have developed CASPROL-T includes Shri T.S. Srinivasan, Shri D. Raghunatha Rao, Dr K.J. Scaria, Dr S. Rajadurai, and Dr N. Ramanathan. □

Synthesis of enantiomerically pure β-aryl/alkyl ketosulphides using alkaloid-based catalysts

The synthesis of optically active β-aryl/alkyl ketosulphides has been attempted by Kum. R.R. Ahuja at National Chemical Laboratory, Pune, using quinine, quinidine, morphine, and their derivatives as catalysts.

Optically active β-aryl/alkyl ketosulphides—important intermediates for the novel four-membered heterocycles—were synthesized by Michael addition of thiophenol to α,β-unsaturated ketones, i.e. benzal acetone and crotonophenone, by using chiral catalysts like quinine sulphate, quinidine sulphate, morphine, and morphine hydrochloride. The effect of the catalyst concentration on the yield was also studied. Optical yields were determined through PMR measurements by using shift reagents. The role of these catalysts in Michael addition was also investigated.

The utilization of quinine/quinidine-based homogeneous catalysts in Michael additions was also studied. Optically active β-aryl/alkyl ketosulphides could be synthesized by using cinchona alkaloids as catalysts, but optical yields were considerably low. To impart a greater measure of rigidity and hence a greater stereospecific approach of the nucleophile, binding of the N_1, and C_9-OH (which has relative 1:4 placement) of the quinine/quinidine molecule with a metal was considered worthwhile. These catalysts were prepared by interacting metal acetylacetonates i.e. $M(acac)_2$ (where M represents metals such as molybdenum, vanadium and uranium) with quinine/quinidine. Some other ligands, such as triphenylphosphine, were used to build different catalysts from copper. The structures of the various organometallics were determined by spectroscopic data. The organometallics were soluble in organic solvents, and were found useful in bringing about optical induction in reactions such as Michael additions when used in catalytic amounts. The effect of catalyst concentration on the degree of optical induction in Michael addition was also investigated.

Kum. Ahuja, who carried out the study under the guidance of Dr V.N. Gogte of NCL, was awarded Ph.D. degree by University of Poona for her thesis based on the studies. □

Rice structure and technological properties

At Central Food Technological Research Institute (CFTRI), Mysore, a researcher, Shri M.K. Bhashyam, of its Rice and Pulse Technology Division, who studied the structure of rice in relation to its technological properties, has developed some techniques which can substantially increase rice production.

The study reveals that milling and shedding losses in rice could be minimized by improving the inherent genetic characteristics of the grain. An index method has been standardized for estimating the crack resistance in rice varieties. By using this method in intra-varietal selection, two crack-resistant lines have been selected; these reduce the breakage losses by 25-75% as compared with the parents. A heterogeneity test based on alkali degradation pattern has been standardized for identifying the suitability of a variety for intra-varietal selection for crack resistance. For predicting the degree of shedding in rice varieties, a histological scale has been developed.

Chalkiness is considered an undesirable character in rice grain as it causes more breakage in milling. However, the study has shown that chalkiness contributes to higher breakage only when it is partial in the grain. But completely expressed chalkiness confers on the grain exceptionally superior milling, cooking and nutritional properties. It has also been shown that the partially expressed white belly character can be eliminated either by genetic manipulation (by keeping the grain breadth below 2.5 mm) or by increasing the nutritional status of the plant.

Pairs of lines identical in all respects except in one character, known as isogenic lines, have been established for cracking, shedding, and grain chalkiness. Critical studies on histological and/or physico-chemical properties associated with cracking, shedding, and grain chalkiness are made possible only by utilizing these isogenic lines.

Studies on topography of grain have shown that the groove depth is associated with the grain dimension. Coarser the grain, the deeper the grooves. Generally, the two dorsilateral grooves are deeper than the other grooves. Deep-grooved grains require more polish to attain the desired whiteness and hence cause more nutritional and milling losses. Therefore their elimination from the grain is beneficial.

With regard to the puffing quality of rice, it has been found that most of the commercial varieties are either moderate or poor puffers. A few varieties like Intan, FT-12, and FT-125 have been identified as good puffers. Ageing of paddy improves the puffing quality; germination or heat gelatinization does not improve this quality.

Generally, expansion of cells and creation of void spaces increase the volume of puffed grain. When the whole grain is puffed as in paddy, splitting, curving and rough surface of the grain cause an additional increase in bulk volume. This is the reason for the higher bulk volume of puffed grain from paddy than from the milled rice in which expansion takes place without splitting, even though the cellular expansion is more in the latter.

For his thesis based on the studies, Shri Bhashyam was awarded Ph.D. by University of Mysore. □

PROGRESS REPORTS

CMERI Biannual Report: 1980-82

Low-horse-power tractor, harvester combine for 20-35 hp tractor, small rice-polishing machine, paddy harvester, automatic reaming machine, single-spindle automatic turret lathe, lens-centring and grinding machine, and road-marking machine are examples of the products of successful R&D work, during 1980-82, of Central Mechanical Engineering Research Institute (CMERI), Durgapur, and its field stations. This is revealed in its biannual report for the period. An important assignment tackled by MERADO-Pune, in collaboration with National Chemical Laboratory (NCL), Pune, is the erection and commissioning at Rangoon of a terpineol pilot plant based on NCL know-how for that country's Central Research Organisation under the Indo-Burma ITEC programme.

The institute continued work on the development of biogas plants which use semi-dried water hyacinth—a menacing weed—for rural use. A 3000-litre capacity plant developed and put into operation at a local school was found to be both technically and economically viable. Based on the development,

Khadi and Village Industries Commission proposes to set up a working plant in Midnapur district, West Bengal. CMERI was also investigating the harnessing of ocean thermal energy. The solar heat stored in the warmer upper layers of sea water could be utilized for producing power by a thermal engine and the colder sea water at sufficient depth could serve as a heat sink.

The project on the development of a low-cost low-horse-power tractor, ideally suited for Indian conditions, was sponsored by Balmer Lawrie & Company Ltd, Calcutta. The mini-tractor developed and put under laboratory and field tests has a 15-hp, 2000 rpm, water-cooled diesel engine of indigenous make. It is fitted with a position control hydraulic system for working of implements and has a gear box which provides six forward and three reverse speeds.

The harvester combine is meant for crops like wheat, paddy, barley, and soyabean. Its field capacity is around 0.44 ha/hr, at 2 km/hr forward speed and 70% field efficiency. Manual harvesting of headland is not necessary for the entry of the combine in the field, as it has a cutter bar of 3.2 m which covers the pulling tractor. The grain tank frame is hinged on to the chassis of the machine to enable easy assembly of the tractor. Two steering wheels in the front and one wheel at the rear serve to distribute the load evenly.

In regard to the development of a small rice-polishing machine, a project sponsored by Ministry of Agriculture and Irrigation, a machine that can polish 200-300 kg of raw or parboiled rice per hour was designed; IIT-Kharagpur collaborated in this project.

The paddy harvester is powered with a 5-hp diesel engine and has four forward and two reverse speeds. It is suitable for small- and medium-sized land holdings, its harvesting capacity being 1.2-1.6 ha per day. Also designed were the matching implements of the harvester like tiller, trailer, and plough.

The machine developed for automatic reaming of bores of internal combustion engine valve-guide to the desired surface finish has a capacity to handle 6000-8000 valve-guides in an 8-hr shift. It has an automatic cycle for reaming, locating, clamping, declamping and linear indexing of fixture slide.

The versatile single-spindle automatic turret lathe has provision for six/eight-station turret. It has five transverse slides including a compound slide at the rear and a separate swing-type bar stop. The machine can be equipped with eleven different tools out of which six can operate simultaneously to perform the desired combination of operations. Commercial manufacture of this machine has started.

The lens-centring and -grinding machine, developed for Precision Optics & Machineries (P) Ltd, Calcutta, can cylindrically grind edges of convex or concave optical lenses (φ5-φ100 mm diam.) parallel to their optical axis. The radial and axial movements of the diamond wheel are cam-controlled and the depth of cut can be preset by a precision micrometer.

A method called 'conforming electrode electrochemical deburring' was worked out in which the cathode is not required to be changed for each application, but the graphite balls placed in the electrolyte are stirred at a speed depending on other process parameters. A machine for deburring was also developed and brass and aluminium samples were successfully deburred.

To generate data for damping properties of the air film in air journal bearings, theoretical work was carried out, and subsequently dynamic damping and stiffness of the air bearings were measured experimentally. Air journal bearings find application in machine tools, and textile and cryogenic industries. They are used to support spindles rotating at speeds of the order of 30,000 rpm and above. By proper optimization of the turbine nozzle dimension, a journal speed of 30,000 rpm was achieved, the bearing performance showing no whirl instability up to this speed. The project was being investigated in partnership with IIT, Kharagpur.

CMERI also developed, under a Commonwealth Science Council project, a versatile prime mover suitable for pump-sets, generating sets, saw mills, rice mills, power tillers, etc. The mover has shown promising results during initial trials.

Important consultancies and technical assistance rendered related to boiler tube failure in power plants, failure of coal-crushing mills, analysis of stress and vibration problems in plant machinery, design of LPG burner, and device for removal of stranded vehicles. □

CONFERENCE BRIEFS

Meeting of International Association for Breast Cancer Research

Dr M.R. Das of Centre for Cellular & Molecular Biology (CCMB), Hyderabad, participated in the meeting of the International Association for Breast Cancer Research (IABCR) held in Denver, Colorado, USA, 20-24 March 1983. Dr Das was invited by the organizers to chair the plenary session on Molecular Biology and Cell Biology, to participate in the board of governors' meeting of the association, and also to present a paper based on work carried out in CCMB.

In his address as chairman, Dr Das reviewed the molecular basis of malignant transformation and the exciting developments that have taken place in our understanding of oncogenes including human cancer genes. He stressed the importance of carrying out basic research in this area in the light of the composite picture on the molecular basis of cancer that is emerging from carefully designed molecular biological experiments, in addition to carrying out clinical experiments on human patients—an area where computer technology is making tremendous advances to control the disease. In the research paper that was scheduled later,

Dr Das presented the work on a high-molecular-weight ribonuclease that was purified from human milk. He discussed the importance of its possible protective function in terms of cleaving RNAs of viral or oncogenic origin. Dr Das had carried out the work in association with Kum. Hemavati of CCMB.

Dr Das reports that the meeting covered current investigations in several areas, such as clinical studies, hormones, biology, virology, immunology, and cell culture. Resumé of work carried out in laboratories distributed over 30 countries was presented in the meeting. The major highlights of the meeting were the progress made in the basic understanding of cancer and the developments in the use of monoclonal antibodies in prognostic studies.

In the business meeting of the association, Dr Das was re-elected to the board of governors for the next term ending 1987; he was elected also a member of IABCR's nomination committee, reports the CCMB scientist.

Visiting, on invitation, National Cancer Institute, National Institutes of Health, Bethesda, Institute of Cancer Genetics, Berkeley University, Berkeley, and the Sloan-Kettering Memorial Cancer Center, New York, the CSIR scientist gave seminars and participated in discussions at these centres. □

PERSONNEL NEWS

Dr Hari Narain retires

Dr Hari Narain, Director, National Geophysical Research Institute (NGRI), Hyderabad, laid down office on 31 March 1983, after heading this CSIR laboratory for nearly two decades.

Taking charge as Director of this institute since its inception in 1964, Dr Narain has built it up into a multidisciplinary laboratory to its present stature of international repute in earth sciences. He has pioneered the indigenous development of airborne geophysical survey methodology and instrumentation. Some 200,000 line-kilometres flown to obtain vital information of the subsurface geology and their mineral potentialities on behalf of a number of state governments, only goes to testify not only to the soundness of the methodology but to its practical utility to the nation. In seismology, he and his team have established new criteria for reservoir-associated earthquakes. Just three other examples of his contributions may be mentioned to show the significance of his work: (i) crustal and upper mantle structure determined in and around the Indian subcontinent through the study of surface and body waves; (ii) a new method for preparing quantitative seismicity maps, and (iii) establishment of observatories to monitor the seismic activity in critical areas besides those near dams and reservoirs.

DR HARI NARAIN

NGRI's contributions to such projects as the Upper Mantle Project have given India a niche today in the world of exploration geophysics and Dr Narain is the principal factor in this. A special monograph brought out in his honour last year was only an acknowledgement of his meritorious contributions in geophysical research.

A fellow of the Indian National Science Academy, Dr Narain has received many other honours from learned societies and the nation's 'Padma Shri'. He has also held many prestigious positions as, for example, member of the (erstwhile) National Committee on Science and Technology, Vice Chancellor of Banaras Hindu University, and Surveyor General of India. Among his international assignments is the leadership of the Indian delegations to the Commonwealth Scientific Committee meeting at Lusaka (1974) and to the general assembly of the International Union of Geodesy and Geophysics at Grenoble (1975). The first UGC's National Lecturer in geophysics (1970-71), Dr Narain has published more than a hundred papers.

Currently he is UNDP's chief project coordinator for its Cuddapah Basin Project and an Emeritus Scientist of CSIR. □

Prof. V.K. Gaur appointed NGRI Director

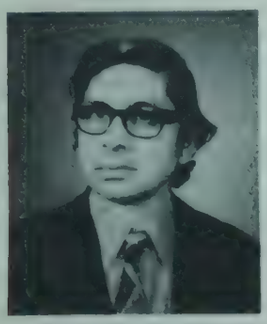
Prof. Vinod K. Gaur has been appointed Director of National Geophysical Research Institute (NGRI), Hyderabad (31 March 1983).

Born 11 July 1936, Prof. Gaur obtained his master's degree in geophysics from Banaras Hindu University in 1955 and Ph.D. from London University in 1959. He was with National Physical Laboratory, Teddington, before joining Roorkee University as reader in geophysics in 1961, where he set to develop, from scratch, a modern instructional programme in geophysics at postgraduate level. In 1966 he was appointed professor in geophysics at the same university.

Prof. Gaur has made significant contributions to both exploration and solid-earth geophysics, among which are his discovery of the 'host rock effect' in geoelectromagnetics and seismotectonics of the Himalayas, including direct measurement of the slip rate along a major Himalayan thrust—a long and painstaking research endeavour which he conceptualized and directed using high-sensitivity precision instruments specifically developed for the purpose. His current research interests include philosophical issues related to geophysical inversion, seismotectonics of the central and north-eastern Himalayas, and physics of rock failure.

Prof. Gaur is currently chairman of Indian National Committee for International Union of Geodesy and

Geophysics, a member of the Science and Engineering Research Council of the Department of Science and Technology, governing body of Wadia Institute of Himalayan Geology, and of a number of advisory committees of



PROF. V.K. GAUR

Indian universities, University Grants Commission, CSIR and Indian National Science Academy. Prof. Gaur has guided 12 scholars for their doctorate degrees and has to his credit more than 50 research papers in addition to a number of technical reports on R&D consultancy.

Prof. Gaur has co-edited three books entitled 'Exploration Geophysics for Geologists and Engineers', 'Recent Researches in Geology' and the 'Geology of Vindhyanchal'. He is on the editorial boards of several journals in the field of earth sciences. He is a recipient of S.S. Bhatnagar Prize (1979), Khosla Research Award (1971) and Khosla Research Prize (1970), both of the University of Roorkee, and Krishnan Medal (1979) of Indian Geophysical Union. He has been a technical consultant to a number of mining, groundwater and engineering projects. He is a fellow of Indian National Science Academy. □

Dr K.A. Kini retires

Dr K.A. Kini, Director, Central Fuel Research Institute (CFRI), Dhanbad, retired on 31 March 1983.

Dr Kini, whose association with the institute dates back to 1949, took charge as director on 5 April 1979, when CFRI was with the Union Ministry of Energy.

Since 1973, Dr Kini, as Scientist F, guided many research projects of the institute as chief project coordinator for many divisions. His stewardship is well recognized in projects concerning coal-to-oil conversion, gasification, carbonization, hydrogenation, solvent extraction of coal, and new energy devices. Dr Kini is an active member of a large number of chemical societies, both national and international.

DR K.A. KINI

On the eve of his retirement Dr Kini donated a sum of money the interest accruing on which deposit will be used to present cash awards, known after the donor, to those CFRI scientists whose contribution is significant in the fields of energy, metallurgy, materials, or environment.

For a fuller account of Dr Kini's academic and professional attainments, see *CN*, 26 (1976), 86. □

Shri B.K. Mazumdar appointed CFRI Director

Shri B.K. Mazumdar, Scientist in director's grade, has taken over as Director of CFRI (31 March 1983) from Dr K.A. Kini, who relinquished his post on superannuation.

SHRI B.K. MAZUMDAR

For an account of Shri Mazumdar's scientific and professional attainments, see *CN*, 32(1982), 174-5. □

Honours & Awards

CMRS scientist wins National Mineral Award

For his outstanding work in mining, Dr Tribhuwan Nath Singh of Central Mining Research Station (CMRS), Dhanbad, has been awarded the National Mineral Award (1980-81), comprising a cash of Rs 6000. Dr Singh has developed a novel technique, called equivalent material mine modelling technique, based on geological and geomechanical considerations of the Indian coal measures. The technique has been helpful in improving the safety, and conservation and recovery of minerals from thick seams as also from seams underneath built-up areas, water bodies and virgin deposits. It has also been helpful in defining the support resistance for the Indian coal measures, which are normally massive in nature.

DR T.N. SINGH

The excellence of the technique has been recognized the world over and Dr Singh was invited to introduce this technique at University of Newcastle-upon-Tyne, UK.

Among the important assignments undertaken by Dr Singh, mention may be made of the study of geometry of the tunnel proposed around Mecca. He is the recipient of two Ph.D. degrees.

* * *

Shri B.D. Baliga of Central Mining Research Station, Dhanbad, has won the Rungta Award, of Rs 1000, of the Mining Engineering Association of India for his contribution to slope stability and for his paper entitled 'Engineering properties of iron ore host rock and landslides' [*Indian Mining & Engineering Journal*, 21(1982), 19]. □

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CSIR NEWS

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Indo-Bulgarian scientific collaboration

At a function held at CSIR Headquarters, New Delhi, on 25 May, India and Bulgaria signed a three-year protocol for further scientific and technological cooperation between the two countries. The agreement followed a meeting of the joint sub-commission of the two countries, which reviewed the progress made so far.

The sub-commission had noted that progress had been good in many areas, particularly in the fields of ionospheric and space physics, corrosion, cultivation and genetic improvement of aromatic and medicinal plants, and contraceptive vaccines.

The protocol, extending the cooperation between the two countries, was signed by Mr A.T. Alexandrov, Vice President of the State Committee for Science and Technical Progress of the Peoples Republic of Bulgaria, on behalf of his country and Dr G.S. Sidhu, Secretary to the Government of India and Director General, Scientific & Industrial Research, on behalf of India.

The agreement envisages the exchange of information and cooperation in some areas of mining and metallurgy, ionospheric and space physics, and physics of radio communications. It also covers the fields of energy including solar energy and solar cells, agriculture and food industry including veterinary science and animal breeding besides machine-building, light industry, electronics and instrumentation, roads and bridges, and marine chemistry.

Exchange of scientific and technical personnel and holding of exhibitions in fields of mutual interest are also provided for in the protocol.

Both sides will support a rational exchange in licences, patents and know-how and recommend the utilization of these to their concerned organizations.

Several CSIR laboratories as well as other organizations will be involved, some of them on a continuing basis, in the programme for cooperation between the two countries. □

Signing the Indo-Bulgarian collaboration agreement are Mr A.T. Alexandrov, Vice President of the State Committee for Science and Technical Progress, Peoples Republic of Bulgaria (left) and Dr G.S. Sidhu, Secretary to the Government of India and Director General, Scientific & Industrial Research

Advances in Electrometallurgy

At a one-day symposium on Advances in Electrometallurgy held at Central Electrochemical Research Institute (CECRI), Karaikudi, on 3 May, research papers and overviews of recent advances in the field of molten salts and hydroelectrometallurgy were presented. More than 200 delegates, who included a cross-section of scientists from industries, academic institutions, and research laboratories, participated. The symposium was presided over by Shri V. Aravamuthan, formerly of CECRI.

Inaugurating the symposium, Dr V.S. Arunachalam, Scientific Adviser to the Defence Minister, complimented this CSIR laboratory on the technology developed for magnesium extraction. Dr Arunachalam also called for more basic research for understanding the

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underlying principles of extraction of metals like aluminium, rare metals, and reactive metals like titanium. It is still possible, according to him, to reduce energy consumption in aluminium production. The defence adviser felt that strategic necessities would compel the country not to depend on foreign technology for the extraction of important metals like lithium, gallium, and rare-earth metals. The speaker also emphasized the importance of computer-modelling and simulation of electrochemical processes.

Dr K.S. Rajagopalan, CECRI's director, while welcoming the delegates, stressed the need for interaction between electrometallurgists drawn from the different sectors. Stating that the value of metals produced in the country by electrochemical and other high-temperature processes amounted to nearly Rs 8000 million, he justified a large outlay on R&D in electrometallurgy. The Karaikudi laboratory's substantial investment on R&D in this area had given good dividends in the form of know-how on metals like sodium, misch metal, magnesium, iron powder and other metal powders, chromium, and gallium, a number of which were already in commercial production, said the director.

The technical sessions dealt with: recent advances in electrowinning and refining of copper, extraction of base metals from complex sulphide ores, improvements in silver refining, pretreatment of anodes for electrowinning, extraction of lithium—a metal of importance to high-energy battery systems, energy savings and increased space-time yield in magnesium production, electro-refining of magnesium, basic researches in molten salt systems used in magnesium production, electrorefining of metals like titanium and zirconium, and electrowinning of lanthanum and cerium.

While the symposium revealed that electrometallurgy is an established technology in the case of production and refining of major nonferrous metals like aluminium, copper and zinc, electrometallurgical techniques were applied to a large extent for the production of magnesium, nickel, lead, and silver. It also predicted wider use of electrometallurgical processing in future in view of the environmental considerations and ability to handle lean and complex ores. It was also felt that recycling and recovery from secondary materials could be accomplished efficiently by electrochemical methods. Because of the emphasis on the utilization of indigenous resources and attainment of self-reliance in key sectors, a high spurt of activity in this field was predicted. The discussions also pointed, in view of the rising costs of energy and increase in the capital as well as operating costs, to the need for improvements in the established electrometallurgical processes. □

To the Scientific Adviser to the Defence Minister, Dr V.S. Arunachalam (left), the institute's director Dr K.S. Rajagopalan is explaining the cyclic voltammetric set-up for corrosion mechanism studies

CEERI's know-how on electronic process control instrumentation for sugar industry utilized

Under an R&D scheme funded by the Electronics Commission, Central Electronics Engineering Research Institute (CEERI), Pilani, had developed: (i) an automatic liming and *p*H control system for juice clarification stage and (ii) panometer for ac resistivity measurement for the pan boiling stage of sugar industry. [see *CN*, 29 (1979), 162.]

The first phase of the work on the two equipment was satisfactorily completed well on the time schedule drawn up jointly by this CSIR laboratory and the Electronics Commission.

Two parties, viz. Satwik Electric Controls, Nasik, and Central Electronics Ltd, Sahibabad, were identified in consultation with the Electronics Commission and Electronics Trade and Technology Development Corporation Ltd to commercialize the technology [*CN*, 32 (1982), 161]. The approach to technology transfer was selective, planned and systematic to pave the way for smooth absorption of technology. Both the firms showed confidence and took interest, initiative and drive to perfect all the processes and techniques. As many as 20 automatic *p*H control equipment and 45 panometers have been installed in about 30 different sugar factories.

The project team have now launched a major programme in microprocessor-

based electronic process control instrumentation for sugar industry with additional support from the Electronics Commission and CSIR.

Undeniably this is a step forward in the march towards self-reliance arising from the confidence the industry has in CSIR's expertise and capabilities. □

RRL-Jammu takes up a turn-key job for a firm

The Regional Research Laboratory, Jammu, has been awarded a turn-key job for setting up a fractionation column for *Java citronella* oil by West Bengal Pharmaceutical & Phytochemical Development Corporation Ltd, Calcutta, at a total cost of about Rs 3.20 lakh. Under the agreement the entire job is to be executed within six months. The plant will process 15 tonnes of the oil per annum and produce perfumery materials worth about Rs 25 lakh. □

Contribution of zooplankton to production potential and ecology of marine environment

Zooplankton forms a major link in the energy transfer at secondary level and hence plays a significant role in the production potential of any aquatic environment. An estimate of zooplankton standing stock provides an index to the fertility of the sea. Keeping this in view, a researcher, Dr (Smt) Vijayalakshmi R. Nair, of the regional centre of National Institute of Oceanography (NIO), Bombay, studied in detail the zooplankton from estuaries, coastal waters, atolls, and oceanic realm of the Indian Ocean.

Biomass and composition of zooplankton in the northern Indian Ocean were studied on the basis of samples collected during the various cruises of *R.V. Gaveshani*. The study showed that zooplankton production was higher in the coastal belt than in the oceanic region. The standing stock of zooplankton along the west coast was double that along the east coast with a concomitant increase in the pelagic fishery. Studies on different groups of zooplankton gave evidence of the environmental preference, abundance and diversity among various groups/species, community structure, co-existence and unusual congregations and effect of thermocline on downward migration in the pelagic realm of the Indian Ocean.

On the basis of extensive studies off Goa, covering a period of three years, a direct relationship between zooplankton and *Trichodesmium* phenomenon has been worked out. Organic matter present in zooplankton is a reliable indicator of the energy equivalent and this constituent in zooplankton collected from estuaries, nearshore and oceanic regions was estimated for assessing secondary productivity. From the rates of secondary productivity in seven estuaries of the west coast, a theoretical estimate of fish biomass was calculated. Production and composition of zooplankton indicate a higher diversity of zooplankton associated with a predominance of carnivores.

Chaetognaths constitute an appreciable part of the marine plankton and in the food cycle of the sea they act as predators and become prey to others. They are good indicators of water masses and other hydrographical conditions. An extensive study on this group over a period of 14 years was taken up for the entire Indian Ocean and adjacent seas including estuaries. Distribution of various species of chaetognaths for the entire Indian Ocean shows the influence of different environmental parameters resulting in characteristic zonations and zoogeographical assemblages. Stratification of chaetognaths in the upper 2000 m of the Indian Ocean suggests their importance in identifying the different water masses. In general, the study emphasizes the part of the Indian Ocean as a connecting link between the Atlantic and Pacific Oceans and the homogeneity of the Indo-Pacific fauna. In the atolls they are being utilized as food by the corals. In an estuarine habitat, chaetognaths act as indicators of salinity regime. During the monsoon period they are removed from the estuary and the area is repopulated during the postmonsoon period. In tropical waters, breeding of these organisms is continuous with a few intense, spawning periods. It has been established that among the possible causes of larval fish mortality, predation by chaetognaths is an important factor.

Evaluation of the degree of pollution by a reliable method helps in the detection and abatement of water pollution. Considering the biological monitoring as one such procedure, the researcher studied the effect of pollution in some of the estuaries of south Gujarat. A high rate of zooplankton production need not necessarily indicate a healthy condition and unusual fluctuations in the standing stock of zooplankton during the different tidal conditions are indicative of the prevailing pollution load. In the coastal waters of Bombay the decrease in diversity of zooplankton in the polluted areas was found to be the first indication of the impending deterioration of the environment.

Dr Nair has been awarded D.Sc. degree by University of Kerala for her thesis based on the study. □

Solvent effect on adiabatic compressibility of polyelectrolytes in solution

In continuation of the studies on adiabatic compressibility of polyelectrolytes being carried out at National Chemical Laboratory (NCL), Pune, Shri M.S. Kirtiwar, after initial investigations in aqueous solutions, has studied the comparative adiabatic compressibility of polymers and copolymers in three different solvents, viz. water, methanol, and dioxane.

The apparent molal compressibility, (ϕK_2) and volume (ϕV_2) for all the ionic (polyacrylic acid and poly N-dimethylaminoethyl methacrylate) and non-ionic (polyvinylpyrrolidone) polymers, their corresponding monomers

and the two copolymers (prepared in combination of the same ionic and non-ionic polymers) studied in the three solvents were found to be concentration-independent. The limiting values, ϕK_2^0 and ϕV_2^0, for polymers showed a considerable decrease over those of monomers in all the solvents. The difference was comparatively smaller in aqueous solution (16.1 cc/mol) than in methanol (24.0 cc/mol) and dioxane (20.5 cc/mol) solutions. However, ϕV_2 values calculated by using the group contributions (obtained from the data for small molecules) and by using the ϕV_2^0 value for model compounds CH_3-CH_2-R and subtracting twice the contribution of one terminal H atom (10.7 cc/mol) were in excellent agreement with the experimental values. Since the values were calculated from data for small molecules, a conclusion of the study is that the polymerization has no effect on the value of ϕV_2^0 of the repeating unit though an apparent difference is observed.

Since the apparent molal volume data for model molecules in non-aqueous solvents were not available, calculation of ϕV_2^0 could not be extended to polymers in non-aqueous solutions in a similar way. The ϕV_2^0 and ϕK_2^0 values for polymers were found to have increased in dioxane solution while in methanol the same values decreased considerably over those obtained from aqueous solution. In dioxane, the solvent-solute interaction appeared to be absent and the solution behaved as an ideal one, while in methanol the decrease was ascribed to the geometric effect since the void space around the molecules is smaller in methanol than in water. In the case of the two copolymers the decreases in compressibility and volume were more pronounced in methanol than in aqueous solution. In dioxane, an increase in the values over those in the case of water was observed. The results show that the change in the solvent nature has a remarkable influence on the compressibility of polymers.

Shri Kirtiwar, who worked as a guest worker under the guidance of Dr P. Roy Chowdhury, was awarded Ph.D. degree by Poona University for his thesis based on the study. □

Laboratory catalytic reactor based on rotating-disc flow

Laboratory reactors used for studying reaction kinetics of vapour-phase heterogeneous catalytic reactions are operated under empirically determined conditions in which the influence of transport processes can be neglected. Shri R.T. Shah of National Chemical Laboratory (NCL), Pune, has attempted the development of a laboratory reactor wherein the transport processes can be quantitatively estimated. The rotating-disc flow system was chosen for this purpose because (i) the rates of heat and mass transfer, known to be uniform over the entire surface of the disc, can be precisely calculated from the boundary layer theory, and (ii) the flow generated by rotating disc is adequate to operate the reactor under mixed-flow (CSTR) conditions.

For the first time, a reactor based on rotating-disc flow has been developed, constructed and tested for the typical reaction of catalytic oxidation of hydrogen by air over Pt-$CaCO_3$ catalyst in the temperature range 27-230 C. A 75 mm disc, in which a pellet of 25-45 mm diam. was embedded, was rotated at 2000-10,000 rpm corresponding to the Reynolds number range of 8000-84,000. The reaction was found to be controlled by the external as well as internal heat and mass transfer effects. The effect of external heat and mass transfer was delineated from the observed data, and it was established that it is feasible to operate a reactor of this type for the study of reaction kinetics as well as of the influence of transport processes.

Shri Shah, who carried out the study under the guidance of Dr L.K. Doraiswamy of NCL, was awarded Ph.D. degree by Banaras Hindu University for his thesis based on the study. □

EXTRAMURAL RESEARCH

Physiological responses to pharmacological drugs and pollutants

There is no endocrine gland in bivalve molluscs. The nervous system plays an important role in controlling physiological activities like digestion, respiration, reproduction, etc. by producing hormones. The nervous transmission is a suitable target for pharmacological drugs and pesticides since it is the basis of a coordination system without which the animals fail to survive. Testing oxygen consumption is one of the methods of sublethal bioassay.

Dr M.L. Jadhav, a CSIR post-doctoral researcher, who worked at the Department of Zoology, Marathwada University, Aurangabad, has investigated the effects of cerebral and visceral neurosecretion, pharmacological stimulation and pesticides on histological changes in the respiratory tissue (gill and mantle) and digestive tissue (midgut gland) and on neurosecretory activity and some physiological activities in bivalve molluscs. Three hours after the administration of reserpine and chlorpromazine, A and B cells from the cerebral ganglia showed an increase in cell area, nuclear diameter and also neurosecretory material over the control mussels. The saline-treated mussels inhibited these changes.

Brain extract in warm, acclimated snails significantly ($P>0.05$) decreased the rate of oxygen consumption; whereas this parameter ($P>0.05$) increased after the administration of brain extract into cold, acclimated snails, *Thiara tuberculata*. Low doses of acetylcholine increased the rate of oxygen consumption significantly ($P>0.05$) in *T. tuberculata*, while 5-hydroxytryptamine and adrenaline in high doses enhanced it. Cerebral and visceral neurosecretion also affected the respiratory metabolism of the bivalve *Lamellidens corrianus*.

A remarkable decrease in amylase, lipase and protease in the cerebralectomized mussels was noticed while only a slight increase was observed after the ganglionic extract injection into the mussels. Ribonucleic acid content of the midgut gland was found to be decreased in the cerebralectomized mussels. However, it increased after the ganglion extract injection. An inference of the study is that a substance in the cerebral ganglia of *L. corrianus* might control the synthesis of RNA. The histological structure of the midgut gland of *L. corrianus* was altered after the ablation of cerebral ganglia.

The LC_{50} values of heavy-metal salts like copper sulphate and mercuric chloride and insecticides like Malathion, Sevimol and Endosulfan for 24, 48 and 96 hr and for seven days were observed in *L. corrianus* and *Parreysia corrugata*. The rate of oxygen consumption and biochemical constituents like protein, glycogen, and lipid decreased after exposure to these pesticides. The above pesticides, the study shows, led to the damage of respiratory tissue (gill and mantle) and digestive tissue (midgut gland) of *L. corrianus* and *P. corrugata*. The pesticides also decreased the neurosecretory material from the cerebral ganglion of the animals.

Dr Jadhav, who carried out the work under the guidance of Dr V.S. Lomte of the Department of Zoology of the same university, was awarded Ph.D. degree.

Dr Jadhav was a CSIR postdoctoral research fellow from 1 February 1982 to 31 January 1983. □

PROGRESS REPORTS

CGCRI Annual Report: 1980-81

The Central Glass & Ceramic Research Institute (CGCRI), Calcutta, investigated, during 1980-81, 55 applied research projects including two sponsored and two collaborative ones. Five basic research projects were also pursued. The processes on synthetic mullite and mullite corundum refractories, sodium silicate from rice husk ash, glass-bonded mica, high-temperature protective enamel for jet-aero engine components, and glass-ceramic tiles were released to industry for commercial utilization. Important projects completed included: (i) production of high-alumina ceramics, (ii) manufacture of cordierite saggers, (iii) improvement of ceramic pots for melting optical and ophthalmic glasses, (iv) synthetic mullite and mullite corundum aggregates and products, (v) utilization of sillimanite from beach sands for glass and steel plant refractories (preliminary investigations), (vi) utilization of beneficiated concentrates from low-grade kyanites from Purulia (West Bengal) and Singhbhum (Bihar) (preliminary investigations), (vii) quality improvement of laser glass type CGL-1, and (viii) high-temperature stable pink stains. The above information is revealed in the annual report of the institute for the period. The report also shows that the projects relating to rural development received special attention. These included development of red clay pottery, glazes of different type, and micro-nutrient glasses. The institute also carried out extensive studies on the utilization of rice husk ash for making silicates and for heat insulation in furnaces.

The process for the production of high-alumina ceramics (92-99.9% alumina) was referred to National Research Development Corporation of India (NRDC) for commercial utilization. High-alumina ceramics find wide applications in electrical, electronic and engineering industries.

The process for the manufacture of synthetic mullite and mullite corundum was released to Kumardhubi Fireclay and Silica Works Ltd, Bihar, through NRDC. Also, about 50 kg of sintered mullite (80% Al_2O_3) was sent to the firm for evaluation. There is a great demand for high-alumina refractories of superior quality by steel plants and other industrial practices.

With the use of reactive alumina, development of ceramic cutting tool bits, their composition and fabrication procedure including firing schedule were standardized.

The laboratory designed, fabricated and set up a laser oscillation cavity with excellent performance. About 20 processed laser glass rods were evaluated for threshold value and slope efficiency and the CGL-2-type rods were found to be 80-85% as efficient as the imported rods of similar type.

Different compositions were tried for making crucibles for laser glass melting and a crucible made with optimum composition could withstand five meltings at 1450°C without developing any crack.

A method was standardized for mechanized production of components like grinding media, nozzles, flow controllers, mating rings, and seal rings.

Under the project on micro-nutrient glasses, a few more glass frits with zinc as micro-nutrient were developed and their solubility in water at different *p*H was studied.

This laboratory's process for the production of sodium silicate solution, conforming to IS specifications, from rice husk ash was passed on to NRDC. A process for the manufacture of potassium silicate from reactive silica obtained from rice husk was standardized. The silicate finds use as binder in the manufacture of welding rods and in the bonding of phosphors in oscilloscopes and TV picture tubes.

The institute had worked out earlier an optimum composition for making pots for melting optical and ophthalmic glasses. Based on the composition, 52 pots of 310-litre capacity were made by slip casting and the performance of these was found to be satisfactory in terms of the quality of the optical glass and yield. The extent of rejection was reduced to about 15%. The pots exhibited better resistance to thermal and mechanical shocks and corrosion. Melting pots were also made for crystal

glass and other special glasses, and for small-scale units.

The dense carbon blocks developed for Rourkela Steel Plant gave satisfactory performance in actual use. Development of dense and impervious carbon refractories for use in chemical industries was taken up and initial attempts were directed towards the development of carbon-based refractories for acid plants.

The laboratory continued to develop a simple technology suited to small-scale sector for manufacturing glazed wall tiles of varying shades using the Gangetic silt deposits of Jaynagar (Howrah) and Palta in West Bengal. Suitable body compositions and a number of lead-free glaze compositions for white and coloured coatings were developed.

The institute continued its work in vitreous enamels, stains, etc. Black, green and brown glass colours maturing in the temperature range 500-550°C with good colour intensity were developed. About two dozen ceramic shades developed by the institute were already available with NRDC.

Optical glass worth Rs 11.00 lakh produced in the institute's pilot plant was sold to the Defence department and others. Twenty-six papers were published and two patents filed. □

TRAINING COURSES

Petroleum Refining Technology

A short-term training course on Petroleum Refining Technology, 14th in the series, for the chemical engineers of Indian Oil Corporation Ltd (IOC), was held at Indian Institute of Petroleum (IIP), Dehra Dun, from 3 February to 8 April 1983. At the valedictory function the IIP Director, Dr I.B. Gulati, informed the gathering that more than 800 engineers, including those from other countries, namely Thailand, Indonesia and Tanzania, had undergone training at his institute. The courses were being regularly updated, the director said, keeping in view the challenges posed by the changing petroleum scene and the feedback received from the trainees and industry. Dr G.S. Sidhu, Director General of CSIR, presided over the valedictory function, and Shri A.J.A. Tauro, Chairman of IOC, distributed certificates to the engineer-trainees. □

CONFERENCE BRIEFS

Industrial and Hazardous Solid Wastes

Shri A.D. Bhide of National Environmental Engineering Research Institute (NEERI), Nagpur, participated in the second international symposium on Industrial and Hazardous Solid Wastes organized by American Society of Testing and Materials at Philadelphia, USA, from 6 to 11 March 1983. In an invited paper co-authored by B.B. Sundaresan and P.V.R. Subrahmanyam the NEERI scientist described the magnitude of the toxic and hazardous waste problem in India and efforts being made to control it. He also outlined an approach for handling such wastes in developing countries.

The countries which participated, besides USA and India, included: FRG, Italy, Poland, Hungary, Egypt, Hong Kong, Thailand, Canada, and UK, reports Shri Bhide.

While in USA, Shri Bhide also visited (12-18 March) the Environmental Protection Agency's laboratories at Cincinnati and held discussions with concerned officials on the Indo-US project entitled 'Analysis' assessment and treatment of toxic discharges from phosphatic fertilizer and basic organic chemical industries', of which this CSIR scientist is the co-principal investigator. □

PATENTS INFORMATION

Indian Pat. 563/Del/82 (Filed)

A process for the preparation of diosgenin horse radish peroxidase conjugates for use in the determination of diosgenin in plant materials

MANJU SARKAR AND S.B. MAHATO
Indian Institute of Chemical Biology, Calcutta 700 032

Described in the patent application are process details for the preparation of diosgenin hemisuccinate horse radish peroxidase conjugate. The conjugate is useful for the rapid determination of diosgenin in plant materials by the homogeneous enzyme immunoassay technique. The technique utilizes the phenomenon of inhibition of the enzyme activity by diosgenin antisera, which is reversed by the addition of free diosgenin. The percentages of activity against different concentrations of diosgenin gives a calibration curve which is linear within a certain range of diosgenin concentration. The plant material containing diosgenin glycosides is hydrolyzed with an acid and the residue is extracted with methanol. The concentration of diosgenin in the methanol solution and hence the percentage of diosgenin in the plant material is then determined. Once the preparation of the conjugate and raising of the diosgenin antiserum are done, diosgenin can be determined quickly and accurately.

The method of raising the diosgenin antisera, which is complementary to the above patent, is covered by another patent (564/Del/82), also standing to the credit of the two patentees.

In this method, diosgenin hemisuccinate is prepared and conjugated with bovine serum albumin. The conjugate is used for raising diosgenin antiserum which is purified by passing through bovine serum albumin-sepharose 4B column. The purified antiserum is used for determining diosgenin in plant materials.

* * *

Indian Pat. 634/Del/82 (Filed)

Process for production of modified sal seed meal by extraction of tannin

V.S. RAO, B.B. PARIDA, K.M. RAO AND S.N. MAHAPATRA

Regional Research Laboratory, Bhubaneswar 751 013

Deoiled sal (*Shorea robusta*) seed meal, a residue left after extraction of sal fat/oil from sal seeds in solvent extraction

plants, is a rich source of starch, protein and tannins. Unlike the other traditional oilseeds, deoiled sal seed meal is not widely accepted as a constituent in feed mix of poultry or dairy industry, owing to its high tannin content.

The invention describes the different features of the process of modifying the deoiled sal seed meal by extraction of its tannin without affecting the content of the meal. Production of the modified meal comprises: (i) tannin extraction from the deoiled sal seed meal by treatment with an aqueous solution of soda ash in one or more stages; (ii) separation of the tannin extract or solution from the treated meal by decanting or filtration; (iii) washing of the treated meal with water to further reduce the residual tannin left in the meal; and (iv) drying of the treated meal to make into a free-flowing granular material. The modified meal thus obtained contains a higher proportion of starch and proteins owing to the reduction of over 85-90% of tannins. As a result, intake of the meal in the cattle feed mix can be doubled without causing any adverse effect on their growth and milk production. □

* * *

Indian Pat. 776/Del/82 (Filed)

β-Alumina diaphragm and solid electrolyte for sodium-sulphur battery-tube forming

K. VENUGOPALAN, M. KAMALUDEEN, N.G. RENGANATHAN,
H.V.K. UDUPA, AND V. ARAVAMUTHAN
Central Electrochemical Research Institute
Karaikudi 623006

β-Alumina in the form of one-end closed tubes is indispensable in the fabrication of sodium-sulphur batteries in which it acts both as a solid electrolyte and as a separator. The invention covers the preparation of highly pure homogeneous β-alumina powder of 3-4 μm size particle in a single decomposition without recourse to other grinding methods. An intimate mixing of the constituents is achieved by melting together calculated quantities of hydrated sulphates like ammonium aluminium sulphate, sodium aluminium sulphate, and magnesium sulphate under their own water of crystallization at 100°C for one hour. This on further heating to 200°C for 3 hr results in a dry mass, which on heating at 1200-1300°C for 3 hr gets decomposed and gives β-alumina powder (confirmed by X-ray diffraction).

One-end closed tubes of uniform wall thickness (2 mm) are formed from this powder by means of the isostatic processing technique. □

PERSONNEL NEWS

Appointments/Promotions

At Structural Engineering Research Centre, Madras, Shri V.N. Gopalakrishnan and Smt. Jolley Annie Peter have been promoted, on assessment, as Scientists B (1 Feb. 1981).

* * *

Shri V.M. Kudale has been appointed Technical Officer C at National Chemical Laboratory, Pune (7 March 1983).

Retirements

Dr S. Banerjee

Dr S. Banerjee, Scientist EII, Central Fuel Research Institute (CFRI), Dhanbad, retired on 31 March 1983.

A chemical engineering graduate from Jadavpur University, Dr Banerjee obtained Dr Ing. degree in fuel technology from the Technical College of Aachen, FRG. Dr Banerjee did pioneering work in fluidization studies at CFRI for well over a decade and half. He studied many aspects of fluid-bed operations of coal, such as production of coal fertilizers, production of active carbon from coal and lignite, heat transfer, pneumatic transportation of coal, and gas purifiction, besides coal carbonization. His effort in the past decade includes studies on solvent extraction of coal at low pressure on a laboratory-scale apparatus, installation of a 12-litre-capacity autoclave for solvent extraction of coal at low pressures with an oil solvent, and production of active carbon from groundnut and cashewnut shells, coconut shells, non-coking coals, and saw dust. □

Honours & Awards

Dr C.M. Gupta wins NAMS' Award

Dr C.M. Gupta of Central Drug Research Institute, Lucknow, has been awarded the National Academy of Medical Sciences (India)—S.S. Misra Memorial Award for 1982-83. This award is for his work on modified liposomes: their suitability as drug carriers—the best unpublished work in biomedical research. The award is given to researchers below the age of 40 years.

The CDRI scientist has contributed to the design and development of a novel class of liposomes suitable for use as drug carriers. So far, the application of liposomes as drug carriers in therapy has been largely restricted by the fact that they are mainly taken up by the liver and their half-life in blood is short. These shortcomings of conventional liposomes have been eliminated by making a highly specific structural change in the phospholipid component of liposomes; the C-2 ester group in phosphatidylcholine has been replaced by a carbamyloxy function in order to modify the stereoelectronic properties of the C-2 ester region.

This modification would (i) render the resulting phospholipids selectively resistant to phospholipase A_2 (a major phospholipid-metabolizing enzyme in liver), which in turn would reduce the capture and lysis of liposomes by the liver; and (ii) lead to tighter packing of phospholipids owing to stabilization of their conformation and as a consequence to reduced lysis of liposomes by the blood.

* * *

Dr S.K. Banerjee of Central Glass & Ceramic Research Institute, Calcutta, has been awarded the Porcelain Enamel Award for 1982 for his paper entitled 'Some Aspects of the Energy Conservation in Enamel Furnace' by the Porcelain Enamellers' Association.

The paper has been communicated to *Transactions of the Indian Ceramic Society*.

* * *

Prof. P.K. Rohatgi

Prof. P.K. Rohatgi, Director, Regional Research Laboratory, Bhopal, has won the Distinguished Alumnus Award for 1983 of the Department of Metallurgical Engineering of Banaras Hindu University, Varanasi, for his 'outstanding contributions to metallurgical research and education'. □

* * *

Dr A.P. Mitra

Dr A.P. Mitra, Director, National Physical Laboratory, New Delhi, has been appointed chairman of the coordination council for the physical and earth sciences group of CSIR laboratories for a period of two years with effect from 15 May 1983 in place of Dr Amarjit Singh, Director, Central Electronics Engineering Research Institute, Pilani. □

ANNOUNCEMENTS

School on Toxicology of Pesticides

This school is being organized by Regional Research Laboratory, Hyderabad, from 7 to 19 November 1983. The objective of the school is to provide participants from educational and research institutions and industry the vast expertise available with this laboratory in such areas as biological and toxicological evaluation of pesticide compounds against target and non-target organisms, structure-activity relationship, target-enzyme interaction and selectivity, neurotoxicity, immunotoxicology, metabolism, synergism and potentiation, persistence, and related aspects.

Further details and application forms available from: Dr Syed S.H. Qadri, head of the Entomology and Toxicology Division, Regional Research Laboratory, Hyderabad 500 009. □

Seminar on Rice Bran Oil

At Regional Research Laboratory (RRL), Hyderabad, will be held a seminar on Rice Bran Oil: Status and Prospects. The seminar, to be held on 13 August 1983 and organized by Oil Technologists' Association of India (southern zone), includes invited lectures and panel discussion. Further details obtainable from the convener Dr M.M. Paulose, RRL, Hyderabad 500 009. □

OBITUARY

Prof. J.N. Mukherjee

A former director of Central Building Research Institute, Roorkee, Prof. Jnanendra Nath Mukherjee, 91, died at Calcutta on 10 March. An internationally known soil scientist and physical chemist, Dr Mukherjee was also for some time chairman of CSIR's Chemical Research Committee. A recipient of 'Padma Bhushan', Prof. Mukherjee also held prestigious positions such as directiorship of Indian Agricultural Research Institute and professorship in Calcutta University. He was also a founding member of Indian Chemical Society. □

COUNCIL OF SCIENTIFIC & INDUSTRIAL RESEARCH

Advertisement No. 11 83

The Council proposes to appoint director for Industrial Toxicology Research Centre (ITRC), Lucknow.

The principal objective of ITRC is conducting research and development in industrial environmental toxicology. The broad areas of work are: epidemiological studies on the prevalence and nature of diseases due to exposure to toxic chemicals in industry and agriculture; safety evaluation of chemicals used in industry, agriculture and households; experimental studies on the mode of action of environmental toxicants; development of diagnostic tests and preventive or remedial measures; environmental and biological monitoring of toxic chemicals; and dissemination of information on toxic chemicals. The laboratory's current research projects relate to studies on industrial dyes, metals, pesticides, plastics, solvents and dust, and these draw upon the expertise from disciplines belonging to biological, chemical and medical sciences. ITRC has plans for expanding its activities, which calls for expertise in environmental carcinogenesis, immuno-, behavioural- and geno-toxicology and assessing the impact of chemicals on diverse ecosystems.

The director is expected to provide a high-level leadership in the formulation and implementation of R&D programmes and projects at national level in industrial toxicology. He should be able to plan and execute programmes of national importance by identifying the role of the institute in analyzing the factors responsible for and minimizing the harmful consequences of industrial toxicity on man and his environment. He should have the ability to establish rapport with academic and professional institutions and governmental agencies dealing with all aspects of development of studies on industrial toxicology.

Qualifications & Experience: High academic qualifications in any branch of biological or chemical or medical sciences, with a proven record of excellence of research and development in areas related to toxicological problems associated with chemicals and industrial products.

Salary/Conditions of Service: The scale of pay attached to the post is Rs 2500-125/2-3000 plus allowances in accordance with the central government rules. Higher initial pay can also be considered. Consultancy earning subject to an upper limit of Rs 15,000 per year is permitted. Free medical aid and leave travel concession are also permissible for the family. Residential accommodation will be provided on payment of rent.

Age: Preferably below 50 years, relaxable in deserving cases.

This is a contractual appointment initially for a period of six years. The contract is extendable and the incumbent can also be confirmed.

Those interested may send in their curriculum vitae in duplicate in the form to be obtained from the office of the Council and send the completed forms to the Joint Secretary (Administration), Council of Scientific and Industrial Research, Rafi Marg, New Delhi 110 001, on or before 20 *July* 1983. Literature about ITRC will also be made available on request from this address. A duly constituted screening committee will decide on the number of scientists to be invited to meet the full selection committee. The decision of the Council in this matter will be final. □

Correction

The development of Auto Bas [*CN*, 33 (1983), 43] was the joint venture of the units, at Madras, of Central Electronics Engineering Research Institute (CEERI) and Central Electrochemical Research Institute, and not of the former unit alone. We are so informed by the CEERI's unit. □

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Three pesticide plants go into production

Three commercial pesticide plants set up on the basis of know-how and basic and detailed engineering provided by Regional Research Laboratory (RRL), Hyderabad, have gone into production. An organophosphorus pesticide complex, set up by Sudarshan Chemical Industries Ltd at Roha, near Pune, started producing Monocrotophos, Diazinon and Quinalphos, the last one being the result of a collaborative project with RRL-Jorhat. The installed capacity of the pesticide complex is 1100 tonnes/annum, with an investment of Rs 50 million. The Monocrotophos plant (capacity, 500 tonnes/annum), set up by NOCIL at Lote Parasuram in Ratnagiri district in Maharashtra, with an investment of Rs 170 million, also went into production in March this year. Another commercial plant (capacity, 300 tonnes/annum) for the production of the fungicide methylbenzimidazole carbamate, set up by Ankur Chemicals Ltd—a subsidiary of J.K. Business Machines Ltd—near Ankaleshwar, was commissioned in February. The investment on this plant is Rs 10 million.

The production from these plants is expected to meet the country's requirements in regard to these pesticides. □

Calcium lactobionate by electrolytic method

A process for the production of calcium lactobionate by the electrolytic oxidation of lactose has been developed by Central Electrochemical Research Institute (CECRI), Karaikudi. Calcium lactobionate is an important drug intermediate used in the preparation of calcium tablets and injectables.

The process involves the oxidation of lactose by using rotating graphite anodes and stationary graphite cathodes. The raw materials used in the process are indigenously available. The process conditions have been standardized in a batch-type electrolyzer capable of oxidizing 2.4 kg lactose per batch. Conversion efficiencies of 85-90% were obtained in the trials.

The product is of high purity and has been accepted by some leading drug manufacturers. The advantages of the process are that it is free from pollution and is highly suitable for the small- and medium-scale sectors. The total outlay for a plant of 15 tonnes per annum capacity is about Rs 17.00 lakh. □

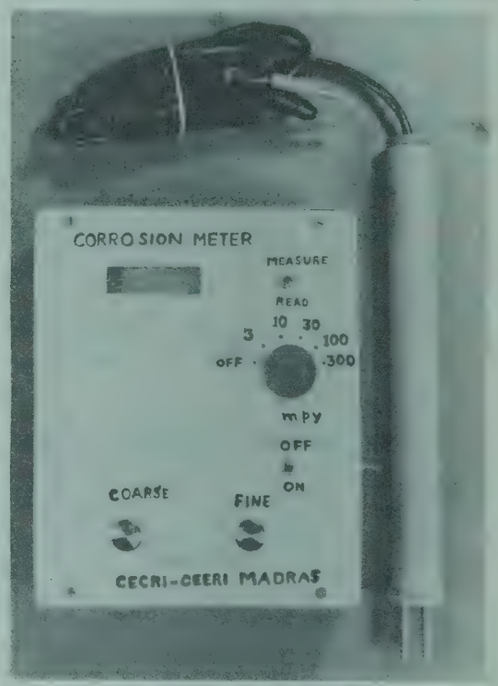
Digital corrosion monitor

A direct-reading-type electronic instrument for measuring corrosion rates has been developed by two CSIR laboratories working in partnership. These are the extension centres, at Madras, of Central Electrochemical Research Institute and Central Electronics Engineering Research Institute.

Such instruments are required for corrosion monitoring in cooling towers, paper and pulp industries and chemical and fertilizer plants, and there is no indigenous instrument available in the country. The CSIR-developed instrument is portable, has a digital display, and operates on two 9V batteries. It can measure corrosion rates up to 300 mils/year.

The electrochemical principle—linear polarization resistance—on which the working of the instrument is based is as follows:

For a metal corroding in a solution, the shift in potential (dE) during polarization when dE is not very far off from the steady corrosion potential is linearly related to the current (di) flowing. The slope of the i-E curve (dE/di) is inversely proportional to the corrosion rate; or the corrosion rate (mils/year or mils/day) = constant $\times di/dE$. By this relationship the



Digital corrosion monitor developed by the extension centres of CEERI and CECRI. Intended primarily for use in cooling-water corrosion control, the instrument can also be used for screening metals and alloys, corrosive media, and corrosion inhibitors.

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corrosion rate can be measured at any given instant, unlike the time-averaged or cumulative values like weight loss and electrical resistance obtained in other methods.

A lab-type probe has been fabricated for preliminary study. Though intended primarily for use in cooling-water corrosion control, the instrument can be used in the laboratory for screening metals and alloys, corrosive media, and corrosion inhibitors. The only limitations are that the corrosion rates and the solution resistance should not be very high. □

Demineralized coal

Secrecy agreements were signed on 16 March by Central Fuel Research Institute (CFRI/CSIR), Dhanbad, Premium Coke Manufacturing Co. (PCMC), Dhanbad, and Chemical & Metallurgical Design Company (P) Ltd (CMDC), New Delhi, on the development of a pilot plant for the production of chemically demineralized coal with very low ash. This is the follow-up of the earlier agreement [*CN*, 32 (1982), 97] under which CFRI has already prepared, and handed over to PCMC, the process package in accordance with CSIR/NRDC guidelines. According to the agreement entered into now, CMDC has been appointed consultant by PCMC for evaluating and rendering engineering services in respect of the pilot plant. □

Cocoa and cocoa-cream biscuits

The Central Food Technological Research Institute (CFTRI), Mysore, has developed formulations for the production of cocoa biscuits and cocoa-cream biscuits which have a good commercial potential. Production of cocoa in India has sharply increased in recent years, and cocoa mass, which is now being produced commercially through the CFTRI technology, can be used in the biscuit formulations.

This CSIR laboratory had undertaken the work on the biscuit formulations at the request of small-scale entrepreneurs who, unlike large-scale biscuit manufacturers, do not have R & D facilities. The CSIR know-how is available on payment of a small fee. □

Cashewnut sheller

The processing of cashew is normally done through a series of steps like driving, roasting, shelling, pulling, and packaging. While the other steps have been modernized to some extent, the shelling operation is still carried out manually. To reduce the human drudgery involved in the prevailing manual operation Mechanical Engineering Research and Development Organisation, Cochin, has designed a simple and inexpensive sheller. This also eliminates the health hazards caused by contact with the corrosive shell liquid. It is a semi-automatic device with shaped cutters to be manipulated by hand and foot.

The know-how is available for commercialization. □

Respiratory efficiency in chronic respiratory diseases

In patients suffering from chronic respiratory diseases, every bout of infection causes some amount of damage to the system which tends to increase the incidence of the disease. Studying the respiratory efficiency in chronic respiratory diseases, such as emphysema and fibrocaseous tuberculosis, Dr S.S. Mukerjee of Central Drug Research Institute, Lucknow, has found a fall in the inspiratory capacity and expiratory reserve. In emphysema, the vital capacity diminished below 60%, the maximum breathing capacity below 20,000 cc and the arterial carbon dioxide increased. Such parameters as tidal air, inspiratory capacity, expiratory capacity, expiratory reserve, vital capacity, maximum breathing capacity and the percentage of breathing reserve were all found to be lower in cases of fibrocaseous tuberculosis.

On correlating clinical and experimental assessment of emphysema, the researcher found, in cases with 1.0-1.5 in. chest expansion, liver dullness in the 7th space and accessory muscles of respiration 'not working', that the breathing reserve was 65-80%, indicating a poor ventilatory function. Cases having 0.5-1.0 in. chest expansion and with liver dullness in the 7th space showed a very poor ventilatory function if accessory muscles were not working and breathing reserve was 52-64%. The ventilatory function was worse when accessory muscles were working and the breathing reserve was 39-52%.

For his thesis based on the studies Dr Mukerjee was awarded M.D. (medicine) degree by Lucknow University. □

Importance of β-glucanases in brewing with adjuncts

Brewing is an age-old art, traditionally evolved by making use of enzymes present in barley malt to convert starch to fermentable sugars through yeast. With the rising consumption of beer as well as the cost of barley malt, newer starchy materials as adjuncts as also simpler technologies are being evolved in the production of beer. Both the nature of the adjunct and its quantity depend on the characteristics desired in beer to be produced. The use of barley or a similar adjunct which contributes to the β-glucan content poses special problems: (i) rise in viscosity, which hinders in getting the maximum amount of extract; (ii) slow filtration of wort and beer; and (iii) sometimes precipitation in the final beer, which causes haziness.

A researcher at Central Food Technological Research Institute, Mysore, has carried out studies to isolate from microorganisms β-glucanases which, used in brewing, could help overcome the problems. The study, made by Shri M.S. Prasad, included isolation and screening of fungi, their identification to elaborate β-1,3-glucanase, and standardization of cultural and nutritional parameters for maximum enzyme titre. Attempts were also made to improve the strain by the use of mutagenic reagents. Biochemical studies on the purification and chara-

cterization of β-1,3-glucanase and the use of this enzyme with different adjuncts such as barley, maize, wheat, and tapioca for brewing were also carried out.

The importance of the study lies in the fact that a beginning has been made in India for producing β-1,3-glucanase and its utilization in brewery. This will help in utilizing more and more of adjuncts. A recent trend in the application of β-1,3-glucanases for breaking the cell walls of yeast and other microorganisms for isolating protein and other useful products from microbial cells is another projected use of the enzyme.

Shri Prasad was awarded Ph.D. degree by University of Mysore for his thesis based on this study. □

Structural characterization of crystalline solids through potential energy

Structural characterization, together with the conformation of the various phases occurring in crystalline solids, has been made by Smt Sujata Mazumder of Central Glass & Ceramic Research Institute (CGCRI), Calcutta. Conformational analysis of various phases observed in kaolin-mullite reaction series has been done through evaluation of the potential energy of the respective phase. A presumption is that the lattice energy will be minimum for the most stable crystalline phase. The heat of reaction observed at various stages can also be explained in the light of lattice energies the various phases assume. The work further establishes that the transformation in the case of the ionic solid will occur in such a fashion that the solid will become closely packed and hence it will have the least number of vacancies. One could hence predict that mullite, the most stable phase in the silica-alumina system, is forming because of the solid-state reaction between silica and alumina.

Conformational analysis of the crystalline structure in the case of a covalent solid is also possible provided the constants involved in the potential form resulting from molecule-molecule interaction are previously known. In that case it is possible to predict the molecular orientation on the assumption that the potential energy, which is virtually the cohesive energy in this case, will be minimum.

The crystal structure of anthranylhydrazine has been determined from three-dimensional intensity data collected on a four-circle diffractometer. The strongly complexing carbonyl group leading to three different types of hydrogen bonding along with the terminal nitrogen atom of $-CONHNH_2$ moiety and nitrogen atom of the strategically placed ring amino group fulfil the criteria of a strongly coordinating ligand towards metal ions, thus producing a large number of stable metal chelates. The antituberculosis activity of anthranylhydrazine probably arises out of its very strong metal chelating ability through which it can successfully compete with an enzyme activator. Alternatively, as a strong metal complexing agent it can attach itself to the exposed side of the central metallo-enzyme and take out the vital metal ion from the enzyme environment.

Smt Mazumder, who carried out the investigation under the guidance of Dr B. Mukherjee of CGCRI, was awarded Ph.D. (Sc.) degree of Jadavpur University for her thesis based on the study. □

Influence of charge non-homogeneity on cycle-by-cycle variations in combustion and nitrogen oxide emissions in SI engines

Lean-mixture operation of spark-ignition (SI) engines is resorted to for improving fuel economy and reducing exhaust emissions. Unsteady engine operation and, hence, poor vehicle drivability, is a general characteristic of SI engines running on lean air-fuel mixtures. This unsteadiness in engine power output results from the cycle-by-cycle variations in combustion.

Cycle-by-cycle variations of combustion in SI engines have been known to exist for many years and a number of investigators have attempted to study the influence of various engine design and operational parameters on cyclic variations. Variations in the mixture motion near the spark plug have been observed to correlate well with the combustion variations for engines when well-prepared fuel-air mixtures are used. In liquid-fuelled SI engines the charge inside the combustion chamber at the time of ignition is not expected to be entirely homogeneous owing to limitations on fuel atomization, vaporization, mixing with air, and residual gases.

Very little information is available on the quantitative relationship of in-cylinder charge non-homogeneity with combustion variations and the influence of such unorganized charge non-homogeneity on exhaust emissions. A researcher, Shri B.P. Pundir, at Indian Institute of Petroleum (IIP), Dehra Dun, has attempted to investigate the dependence of combustion variations and the emissions of nitrogen oxides on in-cylinder charge non-homogeneity.

The charge non-homogeneity was determined experimentally from the measured exhaust gas composition by using Eltinge's technique. This technique was also extended for application to alcohols—potential alternative liquid fuels for vehicles. An on-line high-speed data-acquisition system, DIGITAP, was used for determining cyclic variations in combustion pressure-time history.

Tests were carried out on a CFR engine with two systems of carburation and at different mixture temperatures to obtain varying levels of charge non-homogeneity and with plain and shrouded intake valves. Data were obtained with different fuels: a full-boiling gasoline, methanol, and gaseous propane with different methods of mixture preparation.

Experimental results showed that charge non-homogeneity has a signi-

ficant influence on cyclic variations in peak pressure, specially at overall lean mixtures. A linear correlation between charge non-homogeneity and the peak pressure variations was observed. Under lean-mixture operation, the lower cyclic variations for methanol as compared with those for gasoline were observed mainly because of a shorter duration of the initial phase of combustion, while the lower cyclic variations with propane were found, at least partly, because of an improved charge homogeneity. Nitrogen oxide (NO) emissions reduce with increase in the degree of charge non-homogeneity for the air-fuel equivalence ratios lower than 1.3.

A theoretical model was developed for studying the influence of charge non-homogeneity on cyclic variations in combustion and formation of nitrogen oxides. The principal assumptions made were: (i) the charge non-homogeneity causes cycle-by-cycle variations in the local mixture strength at the spark gap in accordance with Gaussian distribution, and (ii) the elements of different mixture strengths are distributed randomly inside the combustion chamber—a most likely situation statistically. The cyclic variations in the mixture strength cause variations in the duration of initial phase because of variations in the speed of flame propagation and therefore the variations in peak combustion pressure, etc. The influence of the duration of initial phase on peak combustion pressure and the angle of its occurrence was obtained with the use of a combustion model which predicted *p-t* history. The extended Zeldovitch chain reaction mechanism was used for the computations of NO formation.

A good agreement between experimental and computed results on cyclic variations in peak pressure under all the engine operating conditions was observed. Theoretical results showed a linear dependence of cyclic variations on the duration of initial phase. The influence of charge non-homogeneity on NO formation computed theoretically was similar to that observed experimentally. Mixture strength variations in the zone of spark plug have a rather small effect on the average NO emissions while the combustion of a non-homogeneous charge during the main phase influences the NO emissions significantly.

A conclusion of the study is that the methods of preparation of the mixture and the quality of the resulting mixture have a considerable influence on the steadiness of engine operation at lean mixtures. Therefore, considerable attention is required to be paid to develop improved carburettor and intake manifold designs to obtain a near-homogeneous fuel-air mixture. This problem is of greater significance in crankcase-scavenged 2-stroke engines as the mixture tends to be less homogeneous in these engines than in 4-stroke engines.

Shri Pundir was awarded Ph.D. degree (1982) in mechanical engineering by University of Roorkee, Roorkee, for his thesis based on the study. □

PROGRESS REPORTS

RRL-Bhubaneswar Annual Report: 1982-83

The annual report of Regional Research Laboratory (RRL), Bhubaneswar, brought out recently, shows that the laboratory reoriented its activities so as to give more attention to multi-agency and other projects of national importance. As against 36 projects investigated during 1981-82, the number of projects pursued in 1982-83 was 24, which included four multi-agency projects, and two projects under the Indo-FRG technical cooperation programme: (i) agglomeration of ore fines with particular reference to chromite fines and (ii) beneficiation of complex sulphides of copper, lead and zinc and hydrometallurgical extraction of metal values. The laboratory was also investigating the production of solar-grade silicon under a project sponsored by the Department of Science and Technology. Some of the important projects completed and technologies transferred to user industries are: (i) characterization of iron ore tailings from mechanized iron ore washing plants, (ii) enrichment of nickel and cobalt present in the overburden of chromite mines of Orissa, (iii) beneficiation of high-iron manganese ores (all the three projects sponsored by Mineral Development Board), (iv) cathodic protection system for underwater structures at Paradip Port (Paradip Port Authorities), and (v) process for the production of strawberry aldehyde (Rusikulya Arochem, Berhampur).

Under a collaborative project with Engineers India Ltd on solid transportation through pipelines, work was completed on the installation of 25, 50, 100 and 150 mm diam. of 100 and 200 m length test loops consisting of slurry tanks, slurry pump, dc motors and thyristor drive system, etc. Hydraulic test and water run were conducted to establish the system performance.

The mineralogical characterization and metal extraction work on polymetallic nodules was continued. Studies on identification of mineral phases including their structure, element distribution and mode of association of metal values in the bulk and individual nodule sample were completed, and those relating to the development of hydro- and pyro-metallurgical routes for winning the metal values were continued.

Under a project on development of a large-scale flotation column for the identification of coal fines, taken up in collaboration with Steel Authority of India Ltd (SAIL), investigations were carried out with 500 kg samples of flotation feed received from Sudamdih washery by using 56, 80 and 100 mm diam. columns to optimize the operating conditions. A product containing 40% ash could be easily obtained with 80% recovery of combustibles. Also, a product of 7% ash could be obtained with 70% recovery. However, the Sudamdih washery fines were found to

be less amenable to beneficiation in comparison with the middlings from Chasnala washery, tried earlier.

In the project on the preparation of solar-grade silicon through hot-metal refining, slag-refining and directional solidification, a new experimental set-up for directional solidification through controlled heat exchange was designed and fabricated.

A water/oil emulsion system of 30 litres/hr capacity, based on the acoustic atomization principle, was designed and fabricated with a view to minimizing furnace oil consumption in the industrial oil-fired furnaces. The performance of the burner was tested in a rotary kiln of 250 mm internal diam. and 5000 mm length. An added advantage of the system is the reduction in pollution due to flue gases. The studies formed part of a CSIR-SAIL project.

Under another project, pursued in collaboration with Rourkela Steel Plant, studies on mineralogical characterization of Barsua iron ore such as banded hematite Jaspur/quartzite (BHJ/BHQ) massive, blue dust, hard laminated, soft laminated, and laterite ore samples were completed.

The consultancy project on the setting up of a 50 tonnes/day manganese ore pan-sintering plant for Ferro Alloys Corporation of India was nearing completion. A process for roasting of chromite with soda ash was successfully completed and referred to National Research Development Corporation of India for commercialization.

Detailed project reports were prepared for the setting up of a synthetic iron oxide black plant (500 kg/day) for a party from Berhampur and for a synthetic red oxide plant (200 kg/day) for a party from Aligarh.

Three high-yielding varieties of *Solanum viarum* mutant—RRL(B)Y-14, RRL(B)-18 and RRL(B)E-6— were developed and made available for commercial cultivation. Cinnamon cultivation was tried successfully in many parts of Orissa.

Among the other sponsored/collaboration projects started during the year, mention may be made of those relating to the recovery of carbonaceous material from wastes (Graphite India Ltd), beneficiation of low-grade chromite ores (Mishrilal Jain, Orissa), beneficiation of cassiterite (Orissa Mining Corporation, production of sponge iron (SAIL), and process development for conversion of 16-dehydropregnenolone acetate (16-DPA—an intermediate for preparation of steroid drugs) from solasodine (Industrial Promotion and Investment Corporation of Orissa Ltd).

Twenty-eight papers were published, 32 technical papers were presented in symposia, and nine patents were filed.

* * *

CDRI Annual Report: 1981-82

The annual report of Central Drug Research Institute (CDRI), Lucknow, brought out recently, presents the R&D activities of the institute, as in the previous years, in 14 areas pertaining to the development of new chemo- and immuno-therapeutic agents, and standardization of process know-how for drugs, intermediates, fermentation chemicals, and biochemicals. Four research schemes supported/sponsored by outside agencies were continued. A collaborative research programme with the London School of Hygiene and Tropical Medicine on chemotherapy and immunology of malaria, leishmaniasis, and filariasis was started.

A one-pot process for the production of N-methylpiperazine, an intermediate for diethylcarbamazine, from piperazine was developed and demonstrated to a pharmaceutical firm. The process for 2-furoic acid, a drug intermediate, was standardized and handed over to the sponsor CIPLA Ltd, Bombay. Work was completed on a process for pralidoxime methiodide, an antidote to pesticide poisoning; the project was sponsored by Unichem Laboratories Ltd, Bombay.

A four-step process was standardized for the synthesis of 6-methoxytetral-1-one, an intermediate for the manufacture of steroid drugs, from tetralin.

Laboratory-scale synthesis of cephalexin from ampicillin, of pyrithoxin from vitamin B_6, and of three anticancer agents—myleran, triethylenephosphoramide and triethylenethiophosphoramide—were standardized. A simple process was developed for the isolation of α-foetal protein from umbilical cord, serum, and amniotic fluid.

The improved quick-acting cervical dilator was approved for marketing by the Drugs Controller and the clinical trial of Centbucridine, a new local anaesthetic, was completed. The neuroleptic compound Centbutindole was found to have an antipsychotic action like that of trifluperazine but its sedative action was much less; its clinical trial was being expanded. The anti-inflammatory agent Curcumin was found to be almost equipotent to phenylbutazone in episiotomy and for the treatment of certain ENT diseases; it showed no side-effects. An anti-depressant and a contraceptive cream were under clinical trials.

In pre-clinical studies, an acridine derivative was found to cause occlusion of the fallopian tube after transcervical delivery into the uterus of monkey. Punarnavside, a constituent of *Boerhavia diffusa*, exhibited promising antifibrinolytic activity. A new analogue of enkephalin showed 400 times the analgesic activity of morphine in mice. A tetrahydronaphthalene derivative was found to have a pharmacological profile similar to that of the psychic energizer imipramine, but with much less anticholinergic activity.

A synthetic compound was found to be active against the blood-induced erythrocytic stage of the malarial parasite *Plasmodium berghei* in mice. Mastomys appeared to be a suitable host for maintaining *P. berghei* strain NK65. *P. cynomolgi* B infection was successfully transmitted from *Anopheles stephensi* to the rhesus monkey; this model would be used for testing

antimalarial compounds for radical cure activity. Administration of the oral contraceptives norgestrel + ethinyl-estradiol or norethindrone + ethinyl-estradiol to monkeys infected with *P. cynomolgi* B made the infection more acute, but the therapeutic efficacy of chloroquine in contraceptive-treated monkeys was not affected.

The antifilarial drug diethylcarbamazine, known to kill microfilariae, was active also against the adult human filarial parasite *Brugia malayi* in mastomys, when the drug was given in high doses. A combination of Centperazine, a new antifilarial compound, and Clofazimine, an antileprosy drug, was effective against *Dipetalonema vite* filarial infection in mastomys by killing the microfilariae and sterilizing the adult females. A long-acting dosage form of the antileprosy drug diacetyldapsone was prepared which, when implanted under the skin of monkeys, released the drug slowly; its therapeutic level in the blood was maintained up to 165 days.

Three plants, viz. *Hyptis suaveolens*, *Juniperus wallichiana* and *Maytenus wightii*, showed anticancer activity in animals.

Two attenuated cholera vibrio strains CD1 and CD3, obtained earlier by genetic recombination, carry P^+ plasmids; when conjugated with a donor V^+ plasmid strain, P^+V^+ derivatives were obtained which resembled their respective parent strains and were expected to provide a safer and more stable vaccine.

6-MFA, the metabolic product of *Aspergillus ochraceus*, and the double-stranded RNA isolated from it, were found to induce interferon and to stimulate a significant immune response in mice infected with Semliki forest virus, leading to the recovery of the animals.

A six-month insertion of the intra-uterine device, Cu-T, in monkeys inhibited the specific binding of progesterone to cytosol by 40%. The presence of mucus in the isthmic lumen of monkeys and rabbits in the follicular phase just before ovulation and its disappearance after ovulation may explain the physiological delay experienced by the ovum at the ampullary-isthmic junction.

Two hundred and fifty-four research papers and review articles were published. Fourteen patents were filed in India and three in foreign countries. □

CONFERENCE BRIEFS

Indo-Sri Lanka Conference on Development of Marine Resources—Science & Technology

As a member of the Indian delegation, Shri T.K. Dutta, Joint Adviser, CSIR Headquarters, New Delhi, attended the title conference held at Colombo from 18 to 21 February. Shri Dutta's report:

The conference identified programmes of mutual interest and discussed the modalities of cooperation between the two countries. Sectors examined were: Living and non-living resources; Engineering and technology; Data management and information; Management institution and education; and Oceanography surveys.

A report on the Indo-Sri Lanka Cooperation Programme for Development of Marine Resources—Science and Technology was adopted by the conference. The report is expected to be further examined by the two countries, observes the CSIR delegate.

The Indian delegation, led by Shri K. Saigal, Additional Secretary, Department of Ocean Development, comprised representatives from a number of organizations. CSIR was represented, besides Shri Dutta, by Dr T.S.S. Rao, Dr H.N. Siddiquie and Dr R. Sen Gupta of National Institute of Oceanography, Goa. The delegation from Sri Lanka was led by Dr H. Jayawardhane, Chairman of National Aquatic Resource Agency. □

DEPUTATION BRIEFS

Dr Sajid Husain completes assignment as consultant in Indonesia

Dr Sajid Husain of Regional Research Laboratory (RRL), Hyderabad, completed an assignment as consultant at the Food Technology Development Centre (FTDC) of Bogor Agricultural University, Indonesia, from 9 October 1982 to 30 March 1983. The assignment was under an Indonesian Nutrition Development Project aided by the International Bank for Reconstruction and Development.

Shri B. Gopinath, of Centre for Cellular and Molecular Biology, Hyderabad, also worked as a consultant for the same institution where he helped install sophisticated instruments. Earlier, Shri Bharat Bhushan, of RRL-Hyderabad, had done considerable work, as consultant, to bring FTDC to its present stature. □

PATENTS INFORMATION

Indian Pat. 60/Del/83 (Filed)

An improved process for the production of pyridoxine hydrochloride (vitamin B_6)

A.V. RAMA RAO, C.G. JOSHI, M. NARAYANA RAO, AND V.M. SATHE
National Chemical Laboratory
Pune 411008

The development of indigenous technology for the manufacture of vitamin B_6 is a highly sophisticated organic synthesis and its know-how is restricted to a few international pharmaceutical companies. There are innumerable patents and publications in the literature on this product, but it is difficult to make out the precise technology adopted by any of the international companies for its commercialization.

Most of the essential vitamins except vitamin B_6 are now manufactured in this country. Work on this vitamin, initiated at this laboratory quite sometime back, resulted in the development of a process in the mid-70's. The process utilized 4-methyl-5-ethoxy-oxazole as a diene in the Diels-Alder reaction with 4,7-dihydro-1,3-dioxepin to obtain vitamin B_6. The method was uneconomical and had certain difficulties in the scale-up stage.

A totally different approach for its manufacture has now been worked out. This new method offers many advantages besides being most economical. This process has been released through

National Research Development Corporation of India to a private party for commercialization. The technology has also been passed on to Indian Drugs & Pharmaceuticals Ltd.

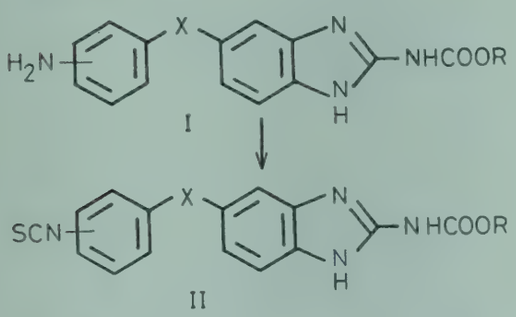
* * *

Indian Pat. 674/Del/82 (Filed)

A process for synthesis of anthelmintic alkyl 5(6)-(isothiocyanatophenyl)thio and sulphonobenzimidazole-2-carbamates

SYED ABUZAR, S. SHARMA, J.C. KATIYAR, A.B. SEN, S.M. JOHRI, SUMAN GUPTA, SHIVE RAM, AND K.V.B. RAO
Central Drug Research Institute
Lucknow 226 001

The patent covers the process for the synthesis of various alkyl 5(6)-(isothiocyanatophenyl)thio and sulphonobenzimidazole-2-carbamates(II, where R is alkyl group and X is S or SO_2) by the reaction of corresponding amine (I) with thiophosgene in the presence of an organic solvent.



These compounds have shown high activity against the cestode *Hymenolepis nana* in rats and mice and the hookworm *Ancylostoma ceylanicum* in hamsters, causing 100% elimination of the parasites at comparatively lower doses given orally. They can be used alone or in admixture in the treatment of humans and animals suffering from single or mixed infections due to cestodes and hookworms, a condition quite common in the tropical regions of the world, including India.

* * *

Indian Pat. 836/Del/82 (Filed)

Process for preparation of pure D-galactose from green Aegle marmelos fruit gum

NILIMA BANERJI AND A.K. DAS
Indian Institute of Chemical Biology,
Jadavpur, Calcutta 700 032

In the process *bael* (*Aegle marmelos*) fruit gum is separated along with the seeds from green mature fruits (5 in. diam.). The gum is dissolved in water, seeds are filtered out, and a calculated amount of sulphuric acid is added to the filtrate so as to maintain the strength of the acid at 0.1 *N*. The solution is heated with occasional stirring on a boiling water-bath for 7 hr and then cooled to room temperature, filtered, and poured in 5 vol. of acetone. Pure galactan is precipitated and isolated as a white powder by centrifugation and desiccation, with an yield of 6-7 g per *bael* fruit.

Galactan (10 g) is mixed with 100 ml of 4% (w/w) sulphuric acid and the mixture is allowed to stand overnight at room temperature. The mixture is heated with occasional stirring in a water-bath at 80-85°C; the galactan gradually dissolves during the first 2-3 hr to form a viscous solution. After it is heated for 12 hr the solution is diluted with an equal volume of water, and filtered. The filtrate is neutralized carefully with barium carbonate (*p*H 6-6.5 with universal *p*H paper). The mixture is filtered and the filtrate is de-ionized by passing through Amberlite IR-120(H^+) and IR-45(OH^-) resins. The de-ionized solution is stirred with 1-2% of active carbon, filtered and evaporated under reduced pressure below 40°C. The syrup is dissolved in 100 ml of hot methanol; 8-10 ml of water is added to clarify the solution which is then seeded with D-galactose and placed in a refrigerator. Crystallization is completed in a week. The crystalline product is filtered, an yield of 5-5.5 g (50-55%) being obtained. □

TRAINING COURSES

Design of Reinforced Concrete Structures

A course on 'Limit State Design of Reinforced Concrete Structures' was organized by Structural Engineering Research Centre (SERC), Madras, from 7 to 16 March 1983. Twenty-eight engineers drawn from private and government organizations attended the course in which 22 lectures were delivered, covering: analysis and design of sections under flexure, shear, torsion, compression; and application of the limit state design concepts to special structures such as deep beams, flat slabs, and water tanks. The faculty comprised SERC's scientists as well as experts from academic institutions, Shri V. S. Parameswaran and Shri A.C.Mani being the coordinator and joint coordinator for the course, respectively.

Copies of lecture notes for the course compiled in a book form (price, Rs 150 per copy) are available from the Information Division, SERC, CSIR Campus, Taramani, Madras 600 113. □

PERSONNEL NEWS

Prof. Harsh Vardhan retires

Prof. Harsh Vardhan, Director, Central Scientific Instruments Organisation (CSIO), Chandigarh, retired, on attaining superannuation, on 29 April 1983.

Under the stewardship of Prof. Harsh Vardhan, CSIO brought to successful completion several highly sophisticated and prestigious projects of national importance. These relate, for example, to the scanning electron microscope, electronic scoreboard, and portable digital multimeter. This laboratory's

repair and maintenance network in the country also expanded, because of his efforts. With his conviction that fully engineered know-how is necessary for its transfer to industry, Prof. Harsh Vardhan guided CSIO to assist the industry, especially in the small-scale sector, to a great extent. And, since Prof. Harsh Vardhan's joining CSIO (Feb. 1973) almost all the know-how developed are well engineered to commercial standards. Thanks to Prof.

Harsh Vardhan, CSIO is now regarded as a premier institution for training in the field of instruments technology.

Prof. Harsh Vardhan's outstanding contributions to science and technology have won him a number of prestigious awards, which include the NRDC's Award in 1966 and the Federation of Indian Chambers of Commerce and Industry's Award in 1978.

For a more elaborate account of Prof. Harsh Vardhan's scientific and professional attainments see *CN*, 29 (1979), 61.

* * *

Dr J. Prasad is CSIO's Scientist in charge

Dr J. Prasad, promoted as Scientist F, has taken over as Scientist in charge of Central Scientific Instruments Organisation (CSIO), Chandigarh, effective 29 April 1983 after Dr Harsh Vardhan retired.

Born 25 July 1933 at Muzaffarnagar, Dr Prasad obtained his B.Sc. in physics in 1950, M.Sc. in 1953 from University of Allahabad, and Ph.D. in 1963 from Calcutta University. Starting his career with CSIR at Central Glass & Ceramic Research Institute, Calcutta, in 1954, he moved in 1965 to CSIO where he held the position of Scientist E since 1971.

At CSIO, Dr Prasad has been responsible for building its Optics Division, which over the years has become the biggest group in this laboratory. The facilities of batch production in the fabrication of precision optics created by him are well recognized throughout the country.

Dr Prasad's fundamental studies on the refraction and spherical wavefronts through cascades of optically homogeneous non-absorbing media have led to the development of new methods for calculation of aberrations and incorporation of flat-plate image correctors in sophisticated optical instruments. Some of the important projects accomplished by CSIO under his supervision are infrared sighting instruments, bubble chamber scanner 20× optics, 16 mm cine projection objective, focimeter, and forestry instruments.

Dr Prasad has rendered consultancy to a number of industrial firms, leading to new products and the establishment of new optical components manufacturing industries. These include design and development of profile projection objectives; optical projection system suitable for incorporation on the Brinell hardness testing machine; glass masters for vernier callipers; production techniques for graticules and fine scales; transit theodolite optics; and parabolic lenses for microfilm readers.

As Unesco consultant Dr Prasad assisted the National Institute of Instrumentation, Bandung, on three different occasions during 1975, 1977 and 1979. He has visited France and USA under bilateral exchange programmes. In France, he acquired advanced training and a diploma in optical instrumentation and technology.

Dr Prasad has to his credit 60 papers, three Unesco reports, and three patents. He has contributed a chapter in John Wiley & Sons' 'Handbook of Measurement of Science Fundamentals'. He is recipient of the prestigious F.I.E. Foundation National Award (1980) in the industrial and technological sector for his meritorious contributions to optical technology. □

Appointments/Promotions

At Central Institute of Medicinal and Aromatic Plants, Lucknow, Shri R.L. Raina has been appointed Library Officer (25 May 1983) and Shri Akhtar Haseeb, Scientist B (1 June 1983).

Transfers

Shri O.P. Saini, Administrative Officer (Gr I) Regional Research Laboratory, Bhopal, has joined, on transfer in the same capacity, National Institute of Science, Technology and Development Studies, New Delhi (20 May 1983).

Honours & Awards

Dr S. Kumar, Director of Central Glass & Ceramic Research Institute, Calcutta, has been elected president of Indian Institute of Ceramics for 1982-83. □

ANNOUNCEMENTS

IASPEI Regional Assembly

The International Association of Seismology and Physics of the Earth's Interior (IASPEI) will be holding a regional assembly at Hyderabad, from 31 October to 7 November 1984. Besides the plenary and administrative meetings of the association and meetings and workshops of the commissions of IASPEI, symposia on the following topics will be held: (i) Deep-seated processes in collision zones, (ii) Seismicity and seismotectonics of Asia, (iii) Terrestrial heat flow and thermal regimes, (iv) Lithospheric structure beneath Asia, (v) Physics of the earth's interior, and (vi) Development of geosciences in developing countries.

Further details obtainable from: Dr Mohan L. Gupta, Secretary, Organizing Committee, IASPEI Regional Assembly, National Geophysical Research Institute, Hyderabad 500 007. □

Obituary

Shri B.A. Shenoi

Shri B.A. Shenoi, Scientist EII, Central Electrochemical Research Institute (CECRI), Karaikudi, died after a brief illness, at Mangalore on 11 April 1983.

Shri Shenoi (born 25 April 1926), a B.Sc. and an M.Sc. in engineering/technology of Banaras Hindu University, Varanasi, joined CECRI in 1953. Shri Shenoi's contributions in electroplating and metal-finishing are well known. To his credit stand 86 research and 44 review papers, and 80 patents. □

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Symposium on Microprocessor-based Systems

A symposium on Microprocessor-based Systems was held at Central Electronics Engineering Research Institute, Pilani, on 5-6 May 1983. Attended by some 50 delegates from various institutions including IITs, R&D laboratories, government organizations, and industries, the symposium spanned five sessions, besides the final panel discussion session. The discussions led to a number of recommendations and suggestions.

Recommendations

Recognizing that microprocessor-based systems are a key technology for modernizing industrial as well as a number of other national activities, the symposium recommended that the future development work on electronics systems, wherever possible, should be based on the extensive use of microprocessors and microcomputers. Maximum resources may be committed, the symposium urged, to the development of applications software and hardware relevant to the specific national needs.

Each organization should build up a software library, and, wherever possible, the software packages could be shared on a national basis. In regard to the applications software it was agreed that these could be made available to other organizations on a commercial basis as is being done in other countries. Such an approach would telescope the time scale in establishing this technology in India on a sound footing, the symposium felt.

Regarding development tools, highest priority be given, the symposium suggested, to low-cost development systems and associated tools which could be made available to a large number of educational, research, and other organizations for training purposes.

It was suggested that development of new electronics systems using microprocessors should be based on hardware available in the country; system software as well as applications software could be developed by the organization entrusted with the development of that particular electronic system.

Noting that the facility for the patenting of the software is not at present available in the country, the panel recommended that a high priority be accorded to this aspect so that commercialization as well as sharing of software packages could be further facilitated.

In regard to the standardization of hardware, it was agreed that the instrumentation bus standard may be taken up on a high priority basis. One of the suggestions was that the country should adopt EURO standard, which has been proved to have considerable flexibility with other standards. A small committee, it was suggested, may be set up by the Electronics Commission to study aspects of bus standardization.

The symposium also recommended that microcomputer terminals as a part of communication effort should be given immediate consideration, particularly by taking into account the requirements of satellite communications links for various applications including ship-to-shore communications.

For effective utilization of microprocessor-based systems in the process control industry, the symposium felt, it would be necessary to develop transducers and actuators which are bus-compatible with various microprocessors. Hybrid integrated circuits, it was recommended, may be considered on a high priority basis for functions such as analog-to-digital conversion and pre-amplification.

The symposium also underscored the importance of manpower training and recommended that various educational and other institutions give high priority to this. □

Seminar on Chemical Plant Optimization by Computer-aided Simulation and Control

The Regional Research Laboratory (RRL), Hyderabad, organized the title seminar in Bombay on 18 April 1983. The objective of the seminar, held in association with Micro Computer Society of India, was to apprise the industry of the expertise available at this CSIR laboratory in the field of computer applications in chemical industries. Some 50 executives from chemical industry attended the seminar.

Shri Dulip Singh, Chairman and Managing Director, Rashtriya

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Chemicals & Fertilizers (RCF), Bombay, who presided, highlighted the role the computer services were playing in the industrial development all over the world. Simulation and optimization studies based on computer techniques could play an important role in the continuous improvement of Indian chemical industry, added the seminar chairman. Shri Dulip Singh also informed the gathering that RCF's Rs 9000 million project at Thal would be the first major chemical plant to use an on-line digital control computer system. He appreciated the efforts being made by this CSIR laboratory in motivating the industry to adopt such modern tools.

The head of the RRL's Chemical Engineering Division, Dr Asgar Husain, described through case studies the areas where application of computer studies could lead to the generation of essential design parameters. He spoke of the experience his team had acquired while working in many leading chemical industries including the Gujarat State Fertilizer Corporation in Vadodara. Dr Husain also highlighted the software developed by his laboratory, which he said had a tremendous scope in chemical industry. □

Strip lacquering of cans

The Central Food Technological Research Institute, Mysore, has developed a simple device for strip lacquering of the end seams of sealed cans to prevent external rusting during storage. The device can lacquer about 1000 cans (A $2\frac{1}{2}$ size) per hour with either an ordinary golden yellow colour lacquer or a colourless spirit varnish. Blueprints of the device are obtainable from the institute on payment of a nominal fee. □

Submerged Dwarka discovered

Underwater exploration and excavation studies conducted recently in the intertidal zone and the sea near Dwarka and the island of Bet Dwarka in Gujarat have brought to light a massive submerged wall of stones of prismatic shape laid on the wave-cut bench in the intertidal zone of the island. The investigations were made by National Institute of Oceanography's (Goa) marine archaeology unit.

The wall lies at a depth of about 3.5 m during high water. The probing and digging in the sea floor by using air-jets in box-like caissons revealed a compact habitation deposit at 1.5 to 2 m depth below the sea bottom under a loose layer of sand. At places some remnants of what appear to be stone structures are encountered.

Pottery of the late Harappan and post-Harappan periods associated with the fortification or toe wall built on the wave-cut bench suggests that the township was submerged in the post-Harappan phase.

Important protohistoric antiquities include earthen jars, bowls and dishes, fish bone beads, shell objects and a

Some of the artefacts of the late Harappan Culture: recovered in the underwater exploration of Bet Dwarka. These include bowl, dish, dish-on-stand, jar, bangles, core of conch shell, chert blade, a stone mould of coppersmith, etc. Those relating to the post-Harappan period (A D 1-4 century) are worked shells, bangle, and a bottle.

coppersmith's stone mould used for casting copper chisels. Other noteworthy early historic finds are a small perfume bottle of the type found in Roman ports and a sprinkler used by Buddhist monks.

Further studies are expected to be made by archaeological experts. □

Rate process of dehydrocondensation of benzene to biphenyl

Thermal dehydrocondensation of benzene is an important industrial process for the production of biphenyl, which forms a basic constituent of commercial thermic fluids.

A researcher, Shri Rahul Das Gupta, at Central Fuel Research Institute, Dhanbad, has adopted a rigorous approach for model building, estimation of model parameters, and discrimination between the rival models. A mixed kinetic model consisting of free-radical and surface reactions has been developed to explain the formation of biphenyl and other products. Equivalent simple molecular models have also been developed for comparing the different kinetic parameters reported in the literature.

The non-isothermal data obtained directly from the experiments were converted to pseudo-isothermal condition and the equivalent reactor volume was calculated by an iterative technique, developed for plug-flow model. The free-radical nature of the reaction has been justified through a set of experiments in the presence of an initiator (acetone).

The effect of variables, like temperature, benzene flow rate, biphenyl in feed, and hydrogen dilution, has been studied to understand the relevant features of product distribution.

The discrimination between the rival models was based upon physicochemical constraints for the parameters and the soundness of the fit of the model by using statistical analysis. The parameters were estimated by using a multiresponse approach. The minimization of the weighted sum of squares of residuals was done by means of Marquardt's non-linear regression algorithm.

The study shows that the decomposition of benzene proceeds through a number of free-radical and surface reactions. The formation of biphenyl and hydrogen is homogeneous and of 1.5 order with respect to the substrate. The formation of terphenyl, triphenylene and hydrocarbon gases proceeds through a heterogeneous path and is of kinetically first order with respect to benzene. Furthermore, the results show that possibilities of coke formation through benzene and polynuclear compounds interaction are, perhaps, higher than the possibility of biphenyl-biphenyl condensation.

Shri Das Gupta, who worked under the guidance of Prof. Binoy R. Maiti of Indian Institute of Technology, Kharagpur, was awarded Ph.D. degree in engineering for his thesis based on the study. □

Copepods of the Indian Ocean

Zooplakton forms the basic food supply of marine life, especially fishes. Copepods, small in size but most adundant of all crustaceans, contribute to the bulk of the zooplankton. Among copepods, calanoids rank first in abundance and among calanoids, scolecithrid copepods are found in all oceans with their abundance in the tropics. Shri T.C. Gopalakrishnan of National Institute of Oceanography's regional centre at Cochin has studied the planktonic copepods (family Scolecithricidae) of the Indian Ocean from the International Indian Ocean Expedition's samples for identification, distribution, systematics, occurrence, and abundance. The knowledge of the taxonomy and distribution of scolecithrid calanoids from the Indian Ocean was until now mainly based on some of the earlier expeditions in this area. No comprehensive study involving methodically collected samples covering the entire Indian Ocean had been made earlier.

In the present study, 27 species belonging to seven genera have been identified, of which one is a new species and two are new records from this area. Zoogeography and species diversity in relation to various environmental parameters were also studied.

Shri Gopalakrishnan, who carried out the study under the guidance of Prof. C.V. Kurian of Central Marine Fisheries Research Institute, Cochin, was awarded Ph.D. degree (1982) by Cochin University. □

Pathological and biochemical studies on *Pleurotus flabellatus*

Pleurotus flabellatus is an oyster mushroom which is cultivated on wet-chopped unfermented rice straw for its white attractive fruit bodies of pleasant flavour. Conditions for the cultivation of this variety have been standardized at Central Food Technological Research Institute (CFTRI), Mysore, which is now studying the problems concerned with the occurrence of contaminants during cultivation and biochemical aspects of the straw substrate and the fruit bodies.

Shri S. Rajarathnam of the institute, who is also associated with this project, has found *Sclerotium rolfsii* to be the most active growth competitor with the mushroom on rice straw that reduced the mushroom yield by 40 to 100%. The contaminant could be completely removed, without affecting the mushroom yield, by treating the straw with carboxin, methyl bromide, or hot water. The treatment posed no problem of toxicity and was commercially feasible.

The researcher also studied the changes occurring in the various constituents of rice straw, viz. free sugars, amino acids, phenols, lignin, cellulose, hemicellulose, ash, and nitrogen at various stages of mushroom growth, from spawning till harvesting of the fruit bodies. By careful manipulation of the sugar, nitrogen, and lignin

levels in the straw substrate, it was possible to avoid the contaminants, increase the mushroom yield, and also modify some of the gross characteristics of the fruit bodies like texture and flavour.

The post-harvest physiological changes occurring in fresh mushrooms were also studied. Extension of shelf-life of the fresh mushrooms was attempted by storing them in polyethylene bags at both ambient and low temperatures.

The researcher also made attempts to characterize the carbohydrates, present in the fruit bodies to the extent of 57%. The two water-soluble polysaccharides of the fruit bodies were studied in detail in view of the increasing importance of such polysaccharides of higher basidiomycetes as antitumour agents. These were found to be mainly glucans with β-glycosidic linkage.

Shri Rajarathnam, who carried out the study under the guidance of Dr M.V. Patwardhan, was awarded Ph.D. degree by University of Mysore. □

Flora of Ganjam district

A study of the flora of Ganjam district, Orissa, has been made by Shri M. Brahmam of Regional Research Laboratory, Bhubaneswar, with a view to assessing the floristic wealth of the district, extending over an area of about 12,000 km^2 and quite rich in flora. Some 1480 species of vascular plants (1476 Angiosperms and 4 Gymnosperms) were collected and classified into 168 families and 46 species of ferns and fern allies. Reported in the study are 30 new records for the flora of Bihar and Orissa and 15 new additions for Orissa.

The researcher also screened 331 plant samples for therapeutically active compounds. Fifteen new alkaloid-bearing plants were found. The oil contents of five plant species were found to be as follows: lemongrass (*Cymbopogon flexuosus*), 0.2%; vetiver (*Vetiveria zizanioides*), 0.1%; *kewda* (*Pandanus fascicularis*), 0.1%; and *Hyptis suaveolens*, 0.1%. The diosgenin content of *Costus speciosus* was 0.2% and solasodine content of *Solanum viarum*, 2.7%.

Shri M. Brahmam, who carried out the studies under guidance of Dr H.O. Saxena of the laboratory, was awarded Ph.D. degree by Utkal University. □

Microbial transformation of steroids

A mutant of *Aspergillus ochraceus* which can convert progesterone into 11α-hydroxyprogesterone in high yields by using a high substrate concentration has been isolated at Regional Research Laboratory (RRL), Jammu. The strain, developed by Smt. Priti Somal, converts progesterone into 11α-hydroxyprogesterone and 6β-11α-dihydroxyprogesterone. Optimization of parameters for the maximum production of 11α-hydroxyprogesterone has been achieved with spores and mycelium of the fungus.

The optimum spore concentration for the desired conversion was found to be 2.5×10^8 spores/ml. Maximum yield was obtained at an oxygen transfer rate (OTR) of 57 m*M* litre $^{-1}$hr $^{-1}$. At low substrate concentrations the dihydroxy compound, 6β-11α-dihydroxyprogesterone, was also detected after 42 hr of incubation. When the substrate concentration was increased the time of formation of the dihydroxy compound increased and the quantity decreased. When the substrate concentration was increased to 20 g litre $^{-1}$, the concentration of 11α-hydroxyprogesterone was 95%, of dihydroxyprogesterone 2%, and of residual progesterone 3% after 120 hr of incubation. The best carrier solvent was found to be acetone; the carbon source, glucose; and optimum *p*H, 6.0. The maximum rate of transformation of progesterone to 11α-hydroxyprogesterone with 20 g litre $^{-1}$ substrate concentration was found to be 0.167 g litre $^{-1}$hr $^{-1}$.

During transformation with mycelium of *A. ochraceus*, the optimum medium for maximum growth consisted of yeast extract, peptone, and sucrose at *p*H 6.5. In this case also, acetone was found to be the best carrier solvent. Optimum OTR was 34 m*M* litre $^{-1}$hr $^{-1}$.

A high substrate concentration gave a higher yield of 11α-hydroxyprogesterone and a lower yield of the dihydroxy compound. With the increase in substrate concentration the formation of dihydroxy compound took place to a lesser extent. The maximum transformation rate with the mycelium was found to be 0.45 g litre $^{-1}$hr $^{-1}$ at a substrate concentration of 40 g litre $^{-1}$hr $^{-1}$.

Transformation of the progesterone by the mycelium of *A. ochraceus* was also studied in laboratory fermenters and optimum parameters were worked out. The optimum values for the various parameters were: agitation rate, 500 rpm; aeration rate, 1.0-1.50 $v_{air}v_{liq.}^{-1}$min. $^{-1}$; height of liquid column/diam. of fermenter, 0.73; and substrate conc., 40 g litre $^{-1}$hr $^{-1}$. Transformation rate was found to be 0.45 g litre $^{-1}$hr $^{-1}$ with 40 g litre $^{-1}$ of substrate concentration at 120 hr. An interesting feature at this level was that the concentration of the dihydroxy compound formed was about 1% only.

Smt. Somal, who worked under the guidance of Dr C.L. Chopra, was awarded Ph.D. degree (1982) by Saugar University for her thesis based on the study. □

EXTRAMURAL RESEARCH

Action of gibberellic acid on some cereals

A CSIR postdoctoral research fellow, Dr A.K. Goyal, while working at the Botany Department of Agra College, Agra, has studied the response of gibberellic acid (GA3) on three cereals, viz. wheat, barley, and rice. Thirty mutants of barley, 10 cultivars of wheat and 30 of rice obtained from various sources were studied. The cereals, after being given presowing soaking treatment of GA3 for 24 hr, were transferred to distilled water and observed for up to 120 hr. After a preliminary trial, four mutants of barley (BM-20, BM-6, BM-65 and BM-185), three cultivars of

wheat [Sonalika (medium), Moti (three-gene dwarf) and Kalyansona (medium)], and four of rice [N22 (tall), KR_3-86, IR 24 (dwarf), and Jaya (semi dwarf)] were selected as the experimental materials. Among these, Moti, N22(tall) and IR 24 (dwarf) exhibited insensitivity to GA3. However, the GA3 insensitivity could be overcome by pretreatment with the phenolic compound cycocel.

With a view to understanding the reason for insensitivity, studies were made at enzymatic levels on tall as well as dwarf cultivars. The enzymes studied were α-amylase, protease, catalase, polyphenolase, IAA oxidase, peroxidase, and RNase. The dwarf cultivar Moti did not respond to catalase and protease activity but responded well to other systems. On the contrary, rice cultivar N22 showed enhancement in catalase activity with different doses of GA3. An inference of the study is that GA3 insensitivity involves quite a complex system and various metabolic systems behave differently to applied gibberellic acid or that it operates at different sites of action selectively but simultaneously.

Further, the dwarf cultivars exhibited higher peroxidase, IAA oxidase and polyphenol oxidase activity than tall counterparts. Also they were less responsive to GA3 treatments in regard to RNase activity and RNA content.

A conclusion of the study is that the genetic structure is responsible for eliciting the different metabolic behaviours of the cultivars in relation to GA3 treatments. □

PROGRESS REPORTS

NEERI Annual Report: 1981-82

The annual report of National Environmental Engineering Research Institute (NEERI), Nagpur, for 1981-82, published recently, shows that during the year 17 R & D projects were completed, 38 projects were continued, and 27 new projects were taken up.

At the request of the Central Board for the Prevention and Control of Water Pollution, the air quality at Taj Mahal was studied. Sulphur dioxide and suspended particulate matter were monitored from January 1981 up to March 1982. As a result of NEERI's recommendations, two thermal power stations, identified as sources of pollution by this laboratory, were closed down. The replacement of steam engines with diesel engines, initiated by the Indian Railways is also a sequel to NEERI's recommendations to control pollution.

A project of considerable importance in waste utilization is the one concerning the production of single-cell protein from cellulosic wastes. To start with, extensive studies have been made on the utilization of bagasse with successful results.

At the request of Central Public Health & Environmental Engineering Organisation (CPHEEO) of the Union Ministry of Works and Housing, NEERI evaluated some select rural water-supply schemes in eleven states, representative of different hydrogeologic, socio-economic and different categories of water-supply systems. A comprehensive report on the two-year evaluation programme was submitted to the government.

On completion of the second phase, the third phase of the Slow Sand Filtration project, sponsored by WHO International Reference Centre for Community Water Supply, The Netherlands, was taken up. This involves studies on the declining rate filtration and minimum bed thickness for satisfactory filtrate quality.

Work on the evaluation of performance of mechanical composting plants in several cities was taken up on a request from CPHEEO. The findings were that a few plants were overmechanized and some units were redundant, leading to high cost of compost production. Hence, it was recommended that redundant units, such as the magnetic separator and rotary conditioner, be identified. Artificial air supply to windrows and covering the windrow yard, it was recommended, are not necessary in tropical conditions.

Under the Indo-US bilateral programme three research projects were continued. An important piece of work concerns the detoxification of phenols through soil microbial cultures, a project which has entered the pilot-plant stage; a unit has been installed at the low-temperature carbonization plant at Naspur in Andhra Pradesh.

The institute has developed a strong information base and necessary infrastructure and expertise for establishing an information system for environmental engineering and science. This provided information on environmental issues to organizations in India and abroad.

* * *

NML Annual Report: 1981-82

The R & D activities of National Metallurgical Laboratory (NML), Jamshedpur, spread over 38 investigations, resulted in the utilization and potential application of many of the products and processes which it developed. This is revealed in the annual report of the laboratory for the period, just brought out. The laboratory also handled consultancy assignments and a large number of sponsored projects.

Technology for production of aluminium-5% magnesium welding filler wire was developed to meet the B.S. 2901-1970-NG6 specifications. This type of filler wire, imported at present, is used for welding sheet-metal components in the manufacture and repair welding of aeroengine components. The NML-produced welding filler wires were used and approved by Hindustan Aeronautics Ltd, Bangalore.

The NML's field unit at Madras successfully completed sponsored investigations on pelletization of Kudremukh iron ore concentrate, in conformity with the guidelines given by Metallurgical and Engineering Consultants India Ltd (MECON). The work involved bench-scale pelletization tests and heat-hardening trials at different variables as well as large-scale pelletiza-

tion at selected parameters and heat-hardening trials in a pot-grate furnace.

The laboratory conducted a number of sponsored investigations on beneficiation and agglomeration of low-grade ores and minerals.

Investigations were carried out on the recovery of tin metal from secondary sources obtained from electrolytic detinning of tin-plate scraps and used tin cans. Bench-scale exploratory experiments were conducted for recovering tin from tin dross obtained during tin coating of wires and for recovering tin from tin sludge of an electrolytic tin-plating plant.

The nickel-free creep-resistant austenitic steel which the laboratory has developed for use in automotive exhaust valves was evaluated by TELCO; the test results were encouraging.

Large-scale industrial production of wire rods made from high-strength medium-conductivity aluminium alloy, designated as NML-PM215, has been undertaken at Bharat Aluminium Co. Ltd, Korba. The wire rods were being processed for the multistrand overhead conductors to meet defence requirements. The wire was also being processed for applications of catenary overhead traction wire for use by the Railways.

A heat-resistant cast-iron alloy—NML-Pyroloy-1000—was undergoing industrial evaluation for various applications. It has given encouraging results and various firms are interested in the products. Carrier-blade castings are employed in the sheet-bar reheating furnaces at TISCO Ltd. Some 500 such castings made with this alloy were installed in their reheating furnace for full-scale evaluation and the castings were found in good condition after trial. Element pins made from this alloy and fitted in the GEC electric heating furnace at the Field Gun Factory in Kanpur were giving excellent service and were in good condition under continuous use. The samples of grillage link castings tested at Rourkela Steel Plant were in very good condition and free from any scale after six months' use at 850°C. In-plant trials of spacer castings of different designs and sizes for gas carburizing at 920°C of automotive components, carried out at TELCO, Pune, gave very satisfactory results. Seven finger castings each weighing 7 kg and made from NML-Pyroloy-1000 were fitted in the pipe-normalizing furnace at IISCO's Stanton foundry in Ujjain for in-plant trials. The castings were reported giving far better service than Cr/Ni alloy fingers.

The laboratory also offered services to various thermal power plants by carrying out investigations on prematurely failed components and suggesting remedial measures.

On behalf of Manganese Ore of India Ltd, NML conducted investigations on the amenability of Chikla manganese ore for the production of electrolytic manganese metal and electrolytic manganese dioxide. □

Toxicology Data Sheets on Chemicals: Thiram

The eighth data sheet in the series 'Toxicology Data Sheets on Chemicals', being compiled by Industrial Toxicology Research Centre, Lucknow, is devoted to the fungicide Thiram. The data sheet contains a brief account of physical characteristics, uses, and toxicology studies. Information on the legal status of the fungicide is also given. The publication (14 pages; compilers: R.R. Khan and Bhaskar Dev) has 125 references, and is obtainable (free of cost) from: The Director, ITRC, Lucknow 226 001. □

Ethnomedicine of Bharia tribe: NBRI's exhibition

The National Botanical Research Institute, Lucknow, organized an exhibition of plants used widely by the Bharia tribe of Patalkot Valley, Chhindwara district, Madhya Pradesh. The occasion was a symposium on Medicinal and Aromatic Plants of Madhya Pradesh, held at Bhopal on 6 May. The exhibition depicted the use by the Bharia tribe of such important medicinal plants as: *Clematis triloba* (for leprosy and snake bite), *Thalictrum foliolosum* (for fever and blood pressure), *Shorea robusta* (for dysentery), *Melastoma malabathricum* (for spermatorrhoea), *Solanum surattense* (for cough, asthma), *Equisetum ramosissimum* subsp. *debile* (for bone fracture), *Adhatoda zeylanica* (for inflammations and body ache), *Schleichera oleosa* (for wound healing in animals), and *Cochlospermum religiosum* (for jaundice). The valley is extremely rich in potential medicinal plant wealth, which could be utilized in integrated tribal development projects and microprojects located in the district. □

CONFERENCE BRIEFS

Conference on Digital Techniques in Fatigue

Dr R. Sunder of National Aeronautical Laboratory (NAL), Bangalore, participated in a conference on Digital Techniques in Fatigue, held in London from 28 to 30 March 1983. The conference was organized by the Society of Environmental Engineers (UK). Dr Sunder's report:

Twenty-two papers were presented on various problems related to computer applications in fatigue research by scientists from UK, USA, FRG, Sweden, and India. The major areas covered included: application of computers in derivation and analysis of data on service loading environment of structures and machines, modelling of inelastic mechanical behaviour of materials, and fatigue damage accumulation and fatigue testing techniques for materials, components and full-scale structures.

The NAL scientist presented two papers: (i) Binary coded event registration on fatigue fracture surfaces, and (ii) Computer analysis of loading data for fatigue evaluation and testing (co-authored by K.N. Raju). The papers embodied the results of recent fatigue research activities at NAL.

The first paper described a method to create binary coded 'signatures' on the fatigue fracture surface for subsequent identification by using transmission electron microscopy. It involves the generation of specially designed binary-coded load sequences to represent any desired information to be punched onto the fracture surface. The second paper dealt with the efforts being made at NAL towards computer applications in predicting fatigue life to crack initiation in notched members under flight-by-flight load sequences and the derivation of service load spectra from flight data records.

* * *

Seventh International Conference on Infrared and Millimetre Waves

Dr M.M. Pradhan of National Physical Laboratory, New Delhi, attended the title conference, which reviewed the innovations and progress made in the various domains of infrared and millimetre waves. Dr Pradhan's report:

Presented and discussed at the conference were 300 papers, including 20 invited papers and 25 keynote addresses, from delegates from 23 countries, who participated in the conference held at Marseilles, France, from 14 to 18 February. The conference covered: infrared detectors, lasers, gyrotron, magnetic resonance in the millimetre waves, infrared emission of terrestrial atmosphere, solid-state devices, optical fibres, industrial applications, and spectroscopy in the region of infrared and millimetre waves.

The NPL scientist presented in his paper a new concept in the absolute detection of infrared radiation, in which a compound pyroelectric infrared detector utilizes the inverse polarity of the pyroelectric signal generated by incident infrared radiation and by local electric heating. The output of the detector becomes null for equivalent radiation and electric power and thus the radiation power is measured in terms of electrical quantities. The detector comprises two uniformly poled plates of a ferroelectric crystal joined together such that the polarity of the domains reverses across the junction. The pyroelectric signal generated by the absorption of radiation on the gold, black surface of the front electrode is counterbalanced by the inverse polarity pyroelectric signal generated by the in-phase electric heating of the back electrode of the detector. The electric heating signal is provided by an auxiliary pyroelectric detector attached and aligned with the compound pyroelectric detector.

The performance of the compound pyroelectric detector as an electrically balanced radiometer was also presented. The detector could be employed for the absolute measurement of radiation power from black body sources and spectral radiation sources; it could precisely measure even the low level infrared radiation, the measurements not being affected by ambient variations.

* * *

Conference on Antennas and Propagation

Dr S.K. Sarkar of National Physical Laboratory, New Delhi, participated in the third IEE International Conference on Antennas and Propagation held in East Anglia, Norwich, from 12 to 15 April. The NPL scientist presented two papers (co-authored by H.N. Dutta and B.M. Reddy): (i) Some tropospheric factors affecting the reliability of microwave LOS (line-of-sight) links over northern India, and (ii) Development of a prediction technique for tropopath loss from observed transhorizon propagation characteristics over India.

The first paper discussed the fading phenomena which are deleterious to communications, especially to digital ones, compensation for which becomes impossible without reducing the data transmission rate. The second paper dealt with troposcatter propagation characteristics observed at 2GHz over a path situated in the north-western region of the country and a new technique for evaluating the transmission loss for tropocircuits developed from the observed propagation phenomena. The new path loss prediction technique discussed was developed by modifying the scattering equation to take into account the actual condition of the atmosphere rather than by assuming a model of homogeneous turbulent conditions.

* * *

Controlled Atmosphere and Fumigation in Grain Storages

Participating, on invitation, in the International Symposium on Practical Aspects of Controlled Atmosphere and Fumigation in Grain Storages held at Perth, Australia, from 10 to 12 April 1983, Shri M. Muthu of Central Food Technological Research Institute (CFTRI), Mysore, presented a paper entitled 'Ethyl formate as a safe general fumigant'. The paper was commended as a most comprehensive work done on any fumigant, focusing attention on its favourable residue behaviour, reports the CFTRI scientist. Shri Muthu further reports:

Ethyl formate is manufactured in India and the work was done in this CSIR laboratory as a sponsored project for IDL Chemicals Ltd, Hyderabad.

Apart from presentation and discussion of papers, the symposium programme included field trips to farm storages, intermediate grain storage terminals, and a major sea front terminal, Kwinana, handling grain for export. Demonstrated at this centre were such aspects as sealing the structures (bins, sheds, bulk heads, silos) for making them air-tight for fumigation with polyurethane foam, testing for air leaks with soap-solution sprays, use of carbon dioxide, and refrigerated air in lieu of fumigation with a view to phasing out the latter in due course.

The organizers of the symposium were the Cooperative Bulk Handling Ltd, a farmers' cooperative, and

Australian Grain Institute Inc., with CSIRO, Australia, and FAO as the collaborators. Delegates from USA, Italy, Australia, France, Brazil, UK, FRG, South Africa, Israel, Swaziland, Malaysia, Canada, India, China, Pakistan, and Bangladesh presented some 55 papers in 12 sessions on various aspects of controlled atmosphere and fumigation including heat treatment.

Two representatives from companies manufacturing aluminium phosphide in India also attended the symposium as delegates to propagate their products in Australia.

Shri Muthu also visited the Entomology Division of CSIRO, Australia, in Canberra and the laboratories of the Agricultural Protection Board at Perth, where vertebrate pest control strategies are being tackled. □

PATENTS INFORMATION

Indian Pat. 633/Del/82 (Filed)

An improved coating composition for rusted steel surfaces for painting

S. GURUVIAH, C. RAJAGOPAL, M. SUNDARAM, AND K.S. RAJAGOPALAN
Central Electrochemical Research Institute
Karaikudi 623006

The improvement in the present invention is over the rust-converting formulation developed earlier (Indian Pat. 2150/Cal/74) at this laboratory for converting rust *in situ* into a protective coating on which painting could be done directly. The formulation, whose know-how was released to four organizations in the country, was reported by the users to be very effective on uniformly rusted surfaces but did not produce a uniform coating on partially rusted surfaces in some practical situations.

At the instance of an organization, this CSIR laboratory took up work to modify the rust converter so as to get a uniform, black and adherent coating on partially rusted surfaces. As a result, it was possible to develop a formulation by incorporating certain addition agents to the rust converter for converting partially rusted surfaces into a uniform, black coating, over which painting could be given directly. Accelerated tests in the laboratory have shown that the performance of paint coatings on this surface is far superior to the that obtained by conventional methods.

Some of the main advantages of this new process:

* Complete removal of rust is not required.
* The treatment gives temporary protection till the application of a primer.
* The converted surface acts as a very good base for painting and increases the paint life to a remarkable extent.
* This method of surface preparation is cheaper compared to the complete removal of rust or complete removal of rust and phosphating.
* All the raw materials used in the formulation are indigenously available.

* * *

Indian Pat. 667/Del/82 (Filed)

Improvements in or relating to a process for the extraction of copper, lead, and zinc from complex sulphide concentrate by oxidative ammoniacal pressure leaching

K. SARVESWARA RAO, SHASHI ANAND, K. SRINIVASA RAO, S.C. DAS, T. SUBBAIAH, AND R.P. DAS
Regional Research Laboratory
Bhubaneswar 751013

The invention relates to a process for extraction of copper, lead, and zinc from complex sulphide concentrate, which mainly consists of three steps: (i) ammoniacal pressure leaching of the concentrate with ammonia-ammonium sulphate solution in the presence of oxygen gas; (ii) separation of metal values from the leach liquors by solvent extraction; and (iii) electrowinning of the metal values from the electrolyte. The route provides, in general, a pollution-free operation for recovery of metal values. More than 90% overall metal recovery could be achieved with moderate operating conditions. Ammonium sulphate is the byproduct, which is readily marketed as a fertilizer. The process can be upgraded to an industrial scale. □

PERSONNEL NEWS

Appointments/Promotions

At National Physical Laboratory, New Delhi, the following have been promoted, on assessment, as Scientists EI: Shri J.R. Anand, Dr S.K. Sharma, Dr K.D. Kundra, Shri S.P. Suri, Dr M.M. Bindal, Dr M.S. Hegde, Shri V.K. Batra, Dr S.B.S.S. Sarma, Dr V.K. Agarwal, Dr Y.V. Ramanamurthi, Dr T.R. Tyagi (all from 1 Feb. 1981), Shri Ram Prasad, Shri S.M. Dhawan, Shri A.K. Agarwal, Dr B.N. Srivastava (all from 1 April 1981), Dr Subhash Chandra (4 Dec. 1981), Dr R.S. Yadav (20 Dec. 1981), Dr Sharwan Kumar (20 Dec. 1981), Shri S.C. Garg (22 Dec. 1981), Dr O.P. Bahl (2 Feb. 1982), Shri R.S. Khanduja (1 April 1982), Dr S.P. Varma (28 July 1982), Shri Joginder Singh (30 Aug. 1982), Dr G.S. Uppal (7 Oct. 1982), and Dr S.K. Sarkar (29 Dec. 1982). □

Retirments

Shri K. Venugopalan

Shri K. Venugopalan, Scientist EI, Central Electrochemical Research Institute, Karaikudi, retired on superannuation on 31 May 1983. With CECRI since 1957, Shri Venugopalan has done pioneer work on electrowinning of metals via fused-salt electrolysis, viz. magnesium metal, sodium metal, misch metal, manganese metal, alloys of magnesium, nickel, lithium metal, etc. Some of the processes have led to the setting up factories, for example misch metal and sodium metal, and Shri Venugopalan was project manager and consultant to set up the factories. He has also developed a number of alloys for hydrogen storage, and made fundamental researches in corrosion. A fellow of SAEST, he has 25 papers and 9 patents to his credit. □

Honours & Awards

Dr A.G. Mathew, Acting Director, Regional Research Laboratory, Trivandrum, has been elected president of the Essential Oils Association of India for a term of two years. □

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CSIR NEWS

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PM emphasizes on indigenous and rural technologies

Addressing the conference of directors of CSIR laboratories, the Prime Minister Smt. Indira Gandhi made a fervent plea for the revival of *swadeshi* spirit in the industrialization of the country. The conference of the directors of the laboratories of Council of Scientific & Industrial Research was held in New Delhi on 28 June.

In a reference to the Technology Policy Statement, which she had announced earlier, in January, the CSIR President stated that technology must meet local needs and make an impact on the lives of the ordinary citizens through better and more effective use of the existing materials and methods of work. At the same time, she clarified, this did not mean that the country should give up more sophisticated technology, which, she reaffirmed, should also find an important place in the nation's programmes. The country's diverse and varied requirements could be met only through effective implementation of the technology policy, she added.

Stating that CSIR and its existing infrastructure ought to be harnessed to national goals, which had already been identified—for example coal, petroleum, renewable sources of energies, defence equipment, forests, drugs, and pesticides—and others to be identified, she voiced her reservations in regard to programmes on the development of pesticides and weedicides because of associated health hazards which companies sponsoring such projects were either uninformed or would not disclose.

Addressing the directors' conference held in New Delhi on 28 June is the Prime Minister Smt. Indira Gandhi. To her left are Prof. Nurul Hasan, Vice President of CSIR, and Shri Shivraj V. Patil, Minister of State for Science and Technology. To the PM's right is Dr G.S. Sidhu, Director General of CSIR.

Expressing satisfaction that linkages between the Council's research institutes and their potential customers had improved, the CSIR President called for further strengthening of such links. Any slackness in this, she warned, encourages users to ask for foreign technology.

In a reference to the get-together with industry which CSIR had organized [*CN*, 33 (1983), 73] in April this year, after some 18 years, the Prime Minister called for such dialogues with user industry to be organized regularly and more frequently. Such meets should be developed into an institutional framework and at constituent laboratory level also, she pleaded. In-house assessment of available technologies, which should become part of the R&D programmes, would enable, she underscored, users to be fully aware of indigenously developed technologies. Greater user participation in research advisory councils would also contribute to the success of adoption of indigenous technologies, she stated. As technologists and scientists move into frontier areas, the responsibility of CSIR laboratories grows, she went on, and they should become more aggressive sales persons to productionize and popularize their developments.

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"Our Technology Policy Statement referred to a preferential regime of incentives for users of indigenously developed technologies and for products and processes resulting from such uses through fiscal and other measures, because we have to neutralize or reduce the disadvantage suffered by such products in comparison with imported products, or those based on imported technology and known brand names. These incentives could be in terms of licensing and other industrial approvals or fiscal reliefs. There is need to create a climate for *swadeshi* spirit, in which industrial units would welcome and promote the use of indigenous technology in preference to imported technology. This in turn would encourage new research in national laboratories, and within industrial units themselves."

If research is successful, we could consider appropriate investment by the public sector itself, if others do not come forward, assured the Prime Minister. Such commitments in atomic energy and space research had achieved spectacular results. Users could help by associating CSIR laboratories at an early stage of technology selection so that they could fully evaluate and consider available, or developing indigenous, technology. Such association of industry with those engaged in research activities at appropriate levels would help in a proper evaluation and selection of technology and fuller utilization of indigenously available technology. CSIR's association in the acquisition of foreign technology would help its later absorption and adaptation. This also needed the strengthening of, and association with, consultancy and engineering organizations. For a poor country, how to reduce the cost of the conversion of technology from laboratory to user was very relevant, stated Smt. Gandhi.

Making an impassioned plea for development of technology suited to rural areas, particularly to reduce the drudgery of rural women, the CSIR President called for association of voluntary agencies in such work. Stating that the biogas programme needed to be expanded over larger areas, the Prime Minister said that CSIR laboratories could do much more in identifying various technologies to help rural population directly and indirectly. Affirming that the true patrons of science or arts are the public, Smt. Gandhi stressed that they had to be educated in the widest sense of the word, made science-minded, and for this they must have higher and more decent standards of living.

Referring to the need for creating an environment for the development of technology which would help solve the nation's multifarious problems, she said that the strong agricultural and industrial base and impressive scientific manpower constantly needed technological inputs for further progress. If changes in procedures for recruitment, management structure, etc. are called for, she made it clear that we should not hesitate, particularly to be able to use younger and creative scientists. While we give full support to the laboratories and the various projects, we should support individual scientists also in their work and to enable new ones to come in, she added.

The CSIR President also stressed the need for a thorough look at the on-going projects with a view to rationalizing them, dropping in the process of appraisal peripheral and cost-ineffective projects. Duplication could also be avoided and resources concentrated on areas of greatest need, she advised.

Prof. S. Nurul Hasan, Vice President of CSIR, said that the Council would play a meaningful role in implementing the Technology Policy Statement, which would go a long way in giving CSIR renewed self-confidence and pride in the national capabilities.

Prof. Hasan added that CSIR had a hard look on the on-going research schemes in the laboratories so as to give a shift in the research policy. "We are taking up research in more significant areas and more important projects in place of a large number of small projects." The number of schemes had been brought down from 1841 in 1981 to 1543 in 1983, a reduction of about 17%. It is our endeavour that the choice of such large and significant projects should be in keeping with the capabilities and aspirations of CSIR and the national priorities, added Prof. Hasan.

Continuing, the CSIR Vice President said that the Council had made considerable progress in strengthening linkages with industries. Since the CSIR-Industry get-together held in April this year, a series of discussions had been held with the Department of Industry and the FICCI president, in pursuance of this objective. The directors were in the process of selecting major projects with the involvement of user industries, he added.

Referring to the secrecy clauses in the agreements entered into for the import of technology, Prof. Hasan spoke of the difficulties which continued to frustrate attempts at absorption and adaptation of imported technology. He therefore suggested that at least in the case of public sectors, the legal agency importing the technology should be the Government of India so that there was no legal impediment in the sharing of essential information between the importing public sector enterprise and CSIR and other R&D agencies.

Dr G.S. Sidhu, Director General, Scientific & Industrial Research, said that the Technology Policy Statement (TPS) had been examined in depth by the directors. The discussions were expected to be finalized in October. He said that the TPS has referred to the need to replace obsolescent technology with modern equipment, as well as to develop technologies which are internationally competitive, particularly those with export potential. Such areas are being identified and a statement would be finalized which he said would give, for each project, the quantifiable outputs, the time schedule for com-

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pletion, the budget, and the monitoring mechanism.

The CSIR Director General also said that it was intended to develop technology forecasting mechanisms at the laboratory and CSIR levels. Referring to technology transfer, he said that a large part of it actually related to information transfer. A design of a pilot information system for CSIR had already been drawn up for discussion by the directors at their next conference, added Dr Sidhu.

The Director General went on to say that R&D organizations should be associated from the very beginning with the import of know-how to guard against replication of outdated technology. □

Conference on Desert Technology

Improving pulses and oilseeds for drought tolerance and development of techniques for better use of water and fertilizer for increasing crop production were the principal recommendations of a conference addressing desert technology. The conference—the Third All-India Conference on Desert Technology—sponsored by the Indian Society of Desert Technology (ISDT), and co-sponsored among others by Central Salt & Marine Chemicals Research Institute (CSMCRI), Bhavnagar, was held at this CSIR laboratory from 11 to 13 April. Some 60 scientist delegates presented and discussed 74 papers in plant sciences (39 papers), physical sciences (25), animal sciences (8) and other disciplines (2).

The conference was inaugurated by Gujarat's Minister of Planning and Finance Shri Sanatbhai Mehta, who called upon the scientists to ameliorate the conditions of the poor living in arid and desert regions of Rajasthan, Gujarat, Punjab, and Haryana by developing desert technology and converting saline and sandy soils into cultivable lands. He also urged the scientists to devise methods to prevent water logging and resultant salinity, which were the major problems confronting marginal farmers. While outlining the progress of China, South Korea, and Philippines, the minister emphasized the need to bring more areas under afforestation and social forestry programme to increase fuel-woods.

Shri Sanatbhai Mehta, Gujarat's Minister of Planning and Finance, delivering the inaugural address at the Third All India Conference on Desert Technology. Seated from right are Shri K.D. Padia (convener), Prof. M.M. Taqui Khan, CSMCRI director, and Prof. C.M. Mathur, ISDT president.

Prof. M.M. Taqui Khan, Director of CSMCRI, in his welcome address dealt with programmes undertaken by this CSIR laboratory for afforestation and emphasized their relevance, specially in the light of India's Technology Policy Statement. The activities and programmes of ISDT, especially those that warrant immediate implementation for afforestation, were dealt with by Dr C.M. Mathur, president of the society.

Shri Sanatbhai Mehta, also participating in the technical session on 'Afforestation, Pasture Development and Economic Plants', dealt with the pros and cons of *Eucalyptus* species as an entity for social forestry. The minister urged that a more detailed analysis of the existing data on species be discussed in a different forum specifically devoted to *Eucalyptus* afforestation.

The plenary session, which was chaired by Shri K.C. Shroff, an eminent industrialist with wide experience in desert development, resolved that emphasis be given to pulses and oilseeds improvement for drought tolerance and that techniques be developed for better use of water and fertilizer for increasing crop production. The session recognized that wasteland utilization is very important and urged that fast-growing species of plants and economic species introduced from abroad for biomass production and valuable products be given priority. That research on *Prosopis* and *Eucalyptus* must have relevance to physiology and genetics was another of the recommendations. It was also recommended that water use efficiency, disease resistance of tree species, and use of multi-purpose species of fodder, fuel and timber should be preferred as mixed cultures and given priority in social forestry programmes.

In the session on 'Animal Sciences', emphasis was laid on the intensification

of cattle, sheep, and camel breeding programmes through artificial insemination up to 50% level to upgrade the less productive indigenous animals and on developing methods of synchronization and embryo transfer techniques. Work on animal nutrition, vaccination programmes to eliminate epidemics, and also the other aspects of animal health and better management needed special emphasis, according to the sessional discussions. The conferees were unanimous that there ought to be legislation on the ban of cattle export to other countries.

In the session on 'Physical Sciences and Plant Sciences', it was recommended that the geotechnical properties of sand dune and other desertic soil studies should bear relevance to metastable structure, densification, and stabilization of shallow and deep deposits. Water being very scarce in arid zone, it was felt necessary to give priority to the development of techniques for optimal use of available water for irrigation, drinking, and industry. Desalination of brackish and saline water, recycling of wastewater and basic research in these aspects, it was suggested, needed more stress. Health-hazardous materials like fluorides and nitrites, the session felt, are to be carefully analyzed in the desert waters and simple methods should be developed for use by laymen for removing these toxic materials. As for the nonconventional sources of energy utilization like solar energy and wind energy, it was recommended that decentralized power stations for rural applications based on solar energy be set up. In view of the possibility to collect and store energy, research on solar pond was accorded priority. The session also suggested that the wind plants of the desert region like *Calotropis* and *Euphorbia* are to be examined for biomass production and fuel. That the socio-economic aspects of the desert region, particularly relating to settlement, migration and resettlement of humans and animals during the normal famine years require to be studied, was another recommendation.

The contributions of CSMCRI's scientists on the effect of salinity on biotechnical changes and introduction of economic plants like jojoba and *Prosopis juliflora* was appreciated by the conference. The scientists of this CSIR laboratory also highlighted their work on desalination techniques, viz. solar stills and reverse osmosis. □

SACC reconstituted

Two CSIR personnel—Dr G.S. Sidhu, Director General of CSIR (*ex officio*) and Dr S.R. Valluri, Director of National Aeronautical Laboratory, Bangalore—are among the members of the Science Advisory Committee to the Cabinet (SACC), which has been reconstituted for a period of two years with effect from 4 June 1983. The member in charge of science in the Planning Commission (Prof. M.G.K. Menon) is *ex officio* Chairman, and the Secretary in the Department of Science and Technology (Dr S. Varadarajan) is *ex officio* Member-Secretary.

Other members are: Chairman, Atomic Energy Commission (Dr H.N. Sethna); Secretary, Department of Space (Prof. Satish Dhawan); Secretary, Department of Atomic Energy and Director, Bhabha Atomic Research Centre (Dr R. Ramanna); Secretary, Department of Electronics (Dr P.P. Gupta); Scientific Adviser to Defence Minister (Dr V.S. Arunachalam); Secretary, Department of Ocean Development (Dr S.Z. Qasim); Director General, Indian Council of Medical Research (Prof. V. Ramalingaswami); Director General, Indian Council of Agricultural Research (Dr O.P. Gautam); Secretary, Department of Environment (Dr T.N. Khoshoo); Secretary, Department of Heavy Industry (Shri D.V. Kapur) (all *ex officio*); Shri H.K. Jain, Indian Agricultural Research Institute; Prof. Rais Ahmed, Vice Chairman, University Grants Commission; Prof. S. Ramaseshan, Director, Indian Institute of Science, Bangalore, and President, Indian Academy of Sciences; Prof. Yash Pal, Chief Consultant, Planning Commission; Prof. A.K. Sharma, President, Indian National Science Academy; Prof. John Barnabas, Head, Postgraduate School for Biological Studies, Ahmednagar; Dr M.S. Valiathan, Director, SCT Institute for Medical Sciences and Technology, Trivandrum; Dr (Kum.) K. Pavri, Director, National Institute of Virology, Pune; Prof. Obaid Siddiqi, Tata Institute of Fundamental Research, Bombay; Prof. C.N.R. Rao, Professor and Chairman, Solid State and Structural Chemistry Unit and Materials Research Laboratory, Indian Institute of Science, Bangalore; and Prof. M.M. Sharma, Professor of Chemical Engineering, Department of Chemical Technology, University of Bombay, Bombay. □

Improved hand-moulding table for building bricks

A hand-moulding table which would obviate the dependence of kiln owners on skilled moulders, presently in short supply, has been designed and developed by Central Building Research Institute (CBRI), Roorkee. A brick moulder of average skill can mould bricks to accurate shape and size with the help of this table. The equipment consists essentially of a wooden table with a metallic/wooden mould fixed on it such that the top edges of the mould project about 5 mm above the table top. The mould is provided with a moveable mild-steel bottom plate centrally attached to a vertical ejector shaft. A frog is fixed to the base plate of the mould. A false, mild-steel bottom plate with its centre cut out to accommodate the frog is also loosely fitted above the base plate. The plate is supported on four, corner bolt heads, whose height is adjustable so that the loose plate can be correctly levelled. A gap of about 10 mm is provided between the two base plates. The vertical shaft is actuated by a foot-operated lever mechanism so that when

Improved hand-moulding table for building bricks designed and developed by CBRI. A moulder with two helpers can mould 1500 *bricks a day using it. The table-moulded bricks are superior in quality to the conventional, ground-moulded ones, and suffer less damage during transport and loading at kiln sites.*

the pedal is pressed down, the base plate is pushed up level with the top edge of the mould.

Field trials, following laboratory studies, have shown that a moulder with two helpers can mould 1500 bricks a day using this table. The table-moulded bricks are superior in quality to the conventional, ground-moulded bricks. Besides, the table-moulded bricks suffered less damage during transport and loading at kiln sites. One more point in favour of this table is that because of the improved dimensional accuracy of burnt bricks, it is possible to achieve accuracy in masonry constructions and hence considerable savings in mortar consumption. □

Two RRL-Hyderabad processes go into commercial production

Glyoxal and a catalyst for hydrogenation of benzene to cyclohexane have gone into commercial production recently. The know-how for both the products have been provided by Regional Research Laboratory (RRL), Hyderabad.

Two commercial plants each with a capacity of 900 tonnes/annum set up earlier by Rajasthan Glyoxal Ltd, Udaipur, and Manish Organics (India) Ltd, Ankaleshwar, with the know-how and basic designs provided by this laboratory are the ones which have gone into successful production.

Glyoxal is an important textile auxiliary agent and an intermediate for drug industry. The production from these two plants is expected to meet most of the country's requirements.

The manufacture of the catalyst has been started by United Catalysts India Ltd (UCIL), Binanipuram, Kerala, on behalf of Gujarat State Fertilizer Co. Ltd (GSFC), Baroda, to whom the know-how developed by this CSIR laboratory was released. The catalyst will be used by GSFC primarily in their commercial plant for the manufacture of cyclohexane, which is an intermediate in the manufacture of nylon-6. The new catalyst replaces the hitherto used imported catalyst.

β-Naphthol plant

Basic engineering package for a 1000 tonnes/annum commercial plant for the production of β-naphthol based on the know-how developed by Central Fuel Research Institute, Dhanbad, has been provided by RRL-Hyderabad to Oswali Chemicals Ltd, Cuddalore, Tamilnadu. This work was sponsored by National Research Development Corporation of India. □

Carbonless copying paper goes into commercial production

Utilizing the technology developed by Regional Research Laboratory (RRL), Jorhat, Strobel Industries, Nizamabad (Andhra Pradesh), has started pre-commercial trial production of carbonless copying paper (CCP) in April-May this year. This is the first commercial firm producing CCP in the country. The CSIR laboratory had released the laboratory-scale process in March. [The principle and the process of making CCP have been published in *CN*, 28 (1978), 29.]

Scientists of this CSIR laboratory gave laboratory demonstration of the process at the industry's site from 24 April to 22 May and also carried out trial production in the coating and converting plant of the company.

The laboratory also provided: (i) process package, including process parameters, raw materials requirements and specifications, test equipment, product specifications, testing and analytical procedures, and material balance, etc.; and (ii) details of types of processing and testing equipment to enable the company to procure them.

The company proposes to take up production on a scale of about 150 tonnes of paper a year to start with. The company is also expected simultaneously to make efforts to expand the production capacity. Strobel Industries have been manufacturing speciality papers, such as direct-copy paper, thermographic paper, and correction paper, all based on technologies developed at RRL-Jorhat. [See *CN*, 31 (1981), 154.] □

CFRI's method for coal transportation finds support from U.S. studies

Oxygen sorption and auto-oxidation leading to self-heating and spontaneous fire are the usual hazards in the storage, transportation, and utilization of coal. Studies carried out by Central Fuel Research Institute (CFRI), Dhanbad, on the chemistry of coal-oxygen interaction and the role of moisture in such a phenomenon have led to a solution of the problem by a simple control of the moisture level in coal piles or stacks.

Based on such a concept, CFRI had suggested a method for safe transportation of coal in shipholds for export of Indian coals to European countries. As a result of the report which CFRI had submitted to the Arbitration Court of

the Joint Hull Committee, London, the problems of shipment of Indian coals vis-a-vis Indian coal warrantee imposed by the Institute of London Underwriter had been solved in 1977. Providing corroboration for CFRI's work is the work of US Coast Guard in 1982 which investigated the problem and arrived at more or less similar observations and recommendations as had been given by this CSIR laboratory five years ago. The recommendations of this US body have been considered for adoption by the International Maritime Organisation for 'Code of safe practice for solid bulk cargoes including coal'.

An allied problem is the storage and stacking of coal at industrial sites such as large thermal power stations. At the request of the National Thermal Power Corporation Ltd with regard to stacking of coal to the tune of about 3-5 lakh tonnes in the stackyard of Singrauli Thermal Power Station at Shaktinagar, Uttar Pradesh, CFRI has undertaken a consultancy project to work out the methodology of safe stacking and storage of coal.

Following the conclusion from the field investigations, a report giving recommendations is under preparation. The same fundamental concepts about the mechanism of coal-oxygen interaction and its minimization by controlling its moisture level have been adopted in such studies. □

Phytochemical study of alkaloids of *Crotalaria candicans* and *Ehretia aspera*

At Regional Research Laboratory (RRL), Jammu, a researcher, Shri Rajinder Singh Jamwal, has isolated five pyrrolizidine alkaloids from the pericarp of *Crotalaria candicans*, of which three were found to be new. These were assigned the structures as: (i) 1α-hydroxymethyl-7β-hydroxy-8α-pyrrolizidine, (ii) 1β-H-12, 13-dihydroxy-12, 13, 14-trimethylcrotalanine, and (iii) 1β-H-12, 13-dihydroxy-13, 14-dimethylcrotalanine. From *Ehretia aspera* (whole plant), two alkaloids were isolated and characterized; one of them is new, and has been named 7-O-(*p*-methoxybenzoyl)retronecanol.

The researcher also attempted to modify high-yielding alkaloids into pharmacodynamic compounds. Monocrotaline, a high-yielding constituent of *C. retusa*, and 1-methylenepyrrolizidine from *C. anagyroides*, were converted into the following three series of compounds through hydrogenation, dehydration, ozonolysis, and bromination: (i) a series of new amides lacking 1, 2-dehydro system from monocrotaline; these amides possess marked hypotensive activity; (ii) a series of hydrazones prepared, keeping in view the cardiotonic activity of 1-oximinopyrrolizidine, from 1-methylenepyrrolizidine; and (iii) a few new bromo compounds from 1-methylenepyrrolizidine. The structures of all the intermediates and new compounds were established through spectroscopic techniques.

Shri Jamwal, who carried out the studies under the guidance of Dr C.K. Atal and (late) Prof. C.N. Haksar, Chief Research Adviser, Regional Research Institute for Cancer, Gwalior, was awarded Ph.D. degree by University of Jiwaji, Gwalior. □

Catalytic reduction of nitroarenes and novel synthesis of orthochloroarylamines from nitroarenes

At National Chemical Laboratory (NCL), Pune, a researcher, Shri P.V. Nikrad, has studied the catalytic reduction of nitroarenes with hydrazine hydrate in the presence of Raney nickel in suitable solvents and the novel ortho-halogenation reaction resulting in the formation of *o*-chloroarylamines from nitroarenes.

Reduction of difficultly soluble dinitroarenes, such as 3, 3′- and 4, 4′-dinitrodiphenylsulphones, with hydrazine hydrate was explored by using different catalysts and solvent systems. The catalysts suitable were found to be Raney nickel alone or in the presence of traces of platinum and palladium on calcium carbonate or carbon in a solvent mixture of ethanol and 1, 2-dichloroethane (1:1). Iron(III) oxide/hydroxide in ethanol or methanol was also effective. Nitroarenes, in general, were advantageously reduced in ethanol/1, 2-dichloroethane (1:1) with 3-molar equivalent hydrazine hydrate in the presence of Raney nickel. Compounds such as *o*- and *p*-aminophenols, and *o*-, *m*- and *p*-phenylenediamines were obtained in quantitative yields and high purity.

Dinitroarenes were partially reduced to the corresponding nitroarylamines by using hydrazine hydrate and Raney nickel in ethanol/1, 2-dichloroethane (1:1) solvent mixture. With a quantity of hydrazine hydrate just sufficient to reduce one nitro group, the major product obtained was the one in which the nitro group at the *ortho* position to hydroxyl or amino substituent was reduced. Although the partial reduction of 2, 4-dinitroanilines, N-substituted 2, 4-dinitroanilines, and 2, 4-dinitrophenol gave good yields of nitroarylamines, 2, 4-dinitrophenol alkyl (or aryl) ethers gave 2, 4-dinitrophenylhydrazine as the main product.

A novel approach to the preparation of *o*-chloroarylamines from nitroarenes involved the initial reduction of the nitro group to hydroxyl amino group. The hydroxylamines were acetylated or benzoylated and the resulting aceto or benzohydroxamic acids were reacted with thionyl chloride in benzene or ether to give *o*-chloroacetanilides or benzanilides by SNi′-type reaction. The free anilines could be obtained by hydrolysis. *o*-Chloroarylamines were the exclusive products—valuable intermediates for dyes, drugs, pesticides, and polymer chemicals.

Shri Nikrad, who carried out the study under the guidance of Dr N.R. Ayyangar of NCL, was awarded Ph.D. degree by University of Poona. □

Enzymatic process to remove excess fat from greasy skins

With a view to developing a process for degreasing skins in acidic condition by the use of a microbial acid lipase, a researcher, Shri N. Muthukumaran, at Central Leather Research Institute (CLRI), Madras, has isolated a new strain of *Rhizopus nodosus* which could produce the acid lipase in considerably high quantities. The researcher screened a large number of moulds to isolate the strain. Nutritional factors and cultural conditions for maximum production of the acid lipase by this mould have been standardized, and an enzymatic degreasing product based on *R. nodosus* acid lipase has been formulated. The researcher has also worked out a new procedure for manufacturing suede clothing leather after enzymatic degreasing. The data obtained from physical, chemical, and microscopical studies of the suede clothing leathers manufactured from woolled sheep skins after the enzymatic degreasing treatment were compared with those of leathers produced after solvent-degreasing treatment.

The extracellular acid lipase isolated from *R. nodosus* was purified to homogeneity by ammonium sulphate fractionation and chromatographic techniques and a purified enzyme in 19.6% yield and 228-fold increase in specific activity was obtained. The acid lipase was fully characterized.

During the purification of the acid lipase, the presence of a glucoamylase in the culture filtrate of *R. nodosus* was observed. This glucoamylase was separated from the acid lipase and purified to homogeneity with 31% yield and 387-fold increase in specific activity. The glucoamylase was also fully characterized.

Shri Muthukumaran (senior research fellow), who carried out the study under the guidance of Dr S.C. Dhar of CLRI, was awarded Ph.D. degree (1983) by University of Madras, for his thesis based on the study. □

Studies on some Indian species of *Agrocybe*

Indian agaric flora is comparatively unknown, and as a result, mushroom wealth is not fully assessed and even known edible forms have not been brought under successful cultivation. This prompted a researcher at Srinagar extension centre of Regional Research Laboratory (RRL), Jammu, Shri S.P. Abraham, to investigate the taxonomy, ecology and distribution of 11 species of *Agrocybe* (family Bolbitiaceae) collected from different localities of the country.

The 11 species could be assigned their respective systematic positions and a key for identification supplied. Of these, three are new species, viz. *Agrocybe indica*, *A. lentispora*, and *A. watlingii*, while five are new records for India, viz. *A. cylindrica*, *A. molesta*, *A. pediades*, *A. pediades* var. *magnispora*, *A. broadwayii*, and *A. arvalis*, the first two being excellent edible forms.

Growth and cultural studies of six strains of four species of *Agrocybe* on two synthetic and two semisynthetic media showed evident differences of morphology, growth patterns, etc. even among strains belonging to the same species.

Physiological effects of 8 carbon and 14 nitrogen sources have been studied. The effect of environmental factors like temperature on hyphal growth and *p*H on the germination of basidiospores has been studied.

The edible species have been analyzed for their nutritive value. The moisture content, nitrogen (including protein), fat, fibre, reducing sugars, ash, mineral, and amino-acid composition were also determined.

Submerged culture trials of edible species of *Agrocybe* viz. *A. cylindrica*, *A. molesta*, *A. lentispora*, and *A. pediades* were carried out to assess their yield of mycelium, a good source of protein. The results hold out promise of commercial exploitation as mycelium has good flavour and is obtained in high yield.

The studies reveal that edible species of *Agrocybe* are at par with any other edible mushrooms in their nutritive value and could be a good source of protein to supplement vegetarian diets.

Shri Abraham, who carried out the studies under the guidance of Dr (Smt) L.N. Nair of the Department of Botany, University of Poona, was awarded Ph.D. degree by this university for his thesis based on the study. □

PATENTS INFORMATION

Indian Pat. 706/Del/82 (Filed)

Improved automatic fire sprinkler for use as a fixed fire protection device

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Roorkee 247667

Automatic sprinklers constitute a form of fixed fire-protection device in high-rise, storage, basement, and industrial buildings. The sprinklers consist basically of a heat-responsive element set in a body with two-yoke arms, a nozzle, and a deflector plate. They act as closures to openings in a pipe layout system charged with water under pressure and are designed to open when the temperature in the event of a fire exceeds a predetermined level. A jet of

Designed and developed by CBRI, Roorkee, this automatic fire sprinkler is a fixed, fire-protection device and has certain advantages, over the hitherto available fire sprinklers, like: quicker response; response at 70 C; a replaceable nozzle which does away with whole-body replacement; wider coverage; and so on.

water from the nozzle after the opening of the sprinkler strikes the deflector plate and is then broken up into water spray, which falls on the fire and controls or extinguishes it.

The hitherto known fire sprinklers are either of glass bulb-type, which are slow in response under convective transfer of heat or complicated fusible-link-type. The design of the fusible link of such sprinklers does not permit them to provide a sure operation. The bodies of these sprinklers cannot be reused because the damaged nozzle requires special machining facility.

The sprinkler, covered by the patent, is of a fusible-link-type, and takes care of all these problems and performs better. Its advantages: quicker response; response at 70°C; replaceable nozzle which avoids whole-body replacement; wider coverage; minimum number of operating parts; and simple construction. Additionally, it is an import substituent.

* * *

Indian Pat. 638/Del/82 (Filed)

Improved electrolytic process for production of lithium metal

K. VENUGOPALAN, M. KAMALUDEEN, N.G. RENGANATHAN, V.R. VIJAYAKUMAR, AND H.V.K. UDUPA
Central Electrochemical Research Institute
Karaikudi 623006

The process consists in electrolyzing a mixture of anhydrous lithium chloride and potassium chloride in equi-weight basis at 430-450°C. The electrolysis is carried out in a refractory-lined mild-steel vessel by employing graphite-rod anode and mild-steel ring cathode which are introduced from bottom and sides respectively and are separated by a mild-steel diaphragm. Lithium formed collects in a collector ring kept over the cathode and because of its low density it rises through a pipe and collects in a container under argon atmosphere. The metal is tapped out from the container periodically. Electrolysis is carried out at 400-500 A, 8-10 V, with anodic and cathodic densities of 1.76 and 0.8 A/cm^2 respectively with a current efficiency of 60%. The main advantages of the process are: (i) by providing a metal collector ring over the cathode, periodic tapping and casting of the metal is made possible as against ladling out from the bath followed by separate casting, and (ii) higher-capacity cells can be installed.

* * *

Indian Pat. 9/Del/83 (Filed)

A process for the production of gallic acid from Terminalia chebula fruits and its subsequent conversion to its trimethyl ether

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Regional Research Laboratory
Bhubaneswar 751013

Gallic acid and its derivatives like trimethylgallic acid and trimethoxy-benzaldelyde are used as starting materials in the pharmaceutical industry for the preparation of hypnotic sedatives, clinical tranquilizers, local anaesthetics and analgesics. At present gallic acid is being imported. In the literature methods are described for the extraction of gallic acid from tannins particularly from oak species and gall nuts.

The present patent covers the process for the production of gallic acid and its subsequent conversion to its trimethyl ether utilizing the fruits of *Terminalia chebula* which are abundantly available in the Indian forests.

* * *

Indian Pat. 66/Del/83 (Filed)

Process for manufacture of silicon varactor diode

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The patent covers a process for the manufacture of silicon varactor diode for VHF/UHF TV tuner circuit. The process employs a novel sequence of conventional planar processing techniques to fabricate the diodes. The advantages of the process are that its reproducibility and repeatibility are good and yields are high. It is therefore suitable for high volume production of the devices. The specifications of the fabricated diodes are:

Capacitance ratio C3/C25 > 4
Breakdown voltage $\geq$ 28 V
Leakage current < 50 nA at 28 V

These diodes in a VHF TV tuner circuit resulted in a gain between 18 and 32 dB in different bands. □

Training course on cultivation and distillation of Java Citronella

The Regional Research Laboratory, Jorhat, organized a short-term training course in the laboratory from 23 May to 2 June 1983 for the benefit of people from rural areas on cultivation and distillation of the oil of Java Citronella.

The training was part of the programme of this CSIR laboratory's rural development activities, which include cultivation of citronella and extraction of its oil. So far, about 500 parties from the North-Eastern Region have taken to farming and distillation of citronella, and produce citronella oil worth about Rs 20 million. □

PERSONNEL NEWS

Appointments/Promotions

At National Chemical Laboratory, Pune, Dr T.N. Guru Row has been appointed Scientist C (1 March 1983) and Dr K.R. Acharya, Scientist B (12 April 1983).

* * *

At Regional Research Laboratory, Jammu, Shri Shanti Sarup has been promoted on assessment as Photographic Officer C (2 Sep. 1981) and Shri C.D. Padha as Scientist B (18 March 1983).

Transfers

Shri P.R. Natarajan has joined National Chemical Laboratory (NCL), Pune, as Administrative Officer (Senior Grade) on transfer from National Geophysical Research Institute, Hyderabad (12 May 1983).

Dr S. Radhakrishnan, Scientist B, National Physical Laboratory, New Delhi, has joined, on transfer, NCL in the same capacity (14 March 1983).

Honours & Awards

Dr D.N. Bordoloi of Regional Research Laboratory, Jorhat, has been elected vice president of the Essential Oil Association of India for a two-year term (1983-85). □

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CSIR NEWS

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CSIR Complex for Himachal Pradesh

The Council of Scientific & Industrial Research is to build a Complex at Palampur in Himachal Pradesh to cater to the industrial needs of the state.

The foundation-stone of this Complex was laid on 2 July by the Vice President of CSIR, Prof. S. Nurul Hasan. To be spread over 200 acres, this CSIR Complex will be the third of its kind under the Council.

Speaking on the occasion, Prof. Hasan called upon the people of Himachal Pradesh to utilize the state's resources in such a manner that while the present generation enjoyed the optimum benefits, the coming generations were also not deprived of the benefits. He said the new complex would render all assistance to improve the economy of the state by encouraging the people to adopt a scientific outlook. The success of the new complex would be gauged from the amount of benefit people derived from it.

According to Prof. Hasan, it was not wise to expect universities to do research in specific fields, as their primary function was educating youth, who in turn would use new science and technology for the general good of the nation. So far, man had not succeeded in fully grasping the Himalayas with their numerous features. But he hoped that science and technology would enable human beings to make the best use of its immense wealth. The general goal of science and technology was the creation of conditions of health, happiness, and better living conditions for the people. The CSIR would do its best to serve the people, added the Council's Vice President.

Shri Virbhadra Singh, Chief Minister of Himachal Pradesh, who presided over the function, said that the state was in need of scientific research to help it solve the problem of unemployment and wiping out poverty through optimum use of its immense resources, including its dust-free atmosphere and industrial peace. Stating that infrastructure for industries had been created in the state, Shri Singh requested CSIR to suggest special technology for industries which could prosper in the state. As the fruit-packing industry was dependent upon forests, the Chief Minister hoped that the new laboratories would help evolve non-timber or minimal timber packing material. Electronics-based factories and minerals and chemical industries could also come up in the state with advantage. The Chief Minister added that, as saturation point had been reached in government employment, science must come forward to aid the state effort by suggesting diversification of industries.

Biotechnology would be the main field of research in the new CSIR Complex, as Dr G.S. Sidhu, Director General of CSIR, stated in his address. □

Seminar on Transportation Costs and Planning

A seminar on Transportation Costs and Planning was held at Central Road Research Institute (CRRI), New Delhi, from 11 to 13 May 1983. The seminar was attended by some 100 delegates from various parts of the country and abroad.

Inaugurating the seminar, Prof. S. Nurul Hasan, Vice President of CSIR, stressed the need for development of all modes of transport in the country and for ensuring that the funds allotted for transport were utilized in a most appropriate manner. He underscored the need for bestowing special attention to the problems of hilly areas, since these areas were entirely dependent on road transport and were cut off from the rest of the country. Also laying emphasis on urban transportation, the CSIR Vice President called upon scientists to evolve low-cost technologies.

Dr G.S. Sidhu, Director General of CSIR, who emphasized the importance of road transportation in the country, described CRRI's studies on transportation as of great significance.

Prof. C.G. Swaminathan, CRRI's Director*, in his welcome speech, said that the results obtained from the two prestigious projects, namely (i) road-user cost study in India and (ii) Bombay metropolitan transportation planning study, recently completed, had provided considerable scope for discussions. The seminar was organized, he added, to get the reactions of experts on the results

*Since retired

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and to identify areas where further research should be undertaken.

Some of the more important suggestions and recommendations emanating from the seminar:

The condition of roads in the country was respondible for the very high cost of operation of vehicles. By improving the roads, a considerable amount of savings in fuel, tyre consumption, repairs and maintenance cost, etc. could be brought about.

The poor condition of roads was responsible for the low speed of different categories of vehicles on Indian roads. Such low speeds resulted in poor utilization of vehicles and a consequent rise in the cost of operation of vehicles.

Recognizing that bad geometrics and inadequate pavement width were the cause of a number of road accidents, the seminar felt that accidents could be reduced by improving the roads. The seminar felt that it was possible to achieve an economy of at least Rs 20,000 million annually by improving the roads.

The seminar sounded a note of warning on the deteriorating traffic conditions in Bombay city, which were on the verge of collapse because of the steep rise in urban population and the vehicle population. As a short-term measure, the seminar suggested improvement of junctions and traffic management schemes. Because large investments would be needed for solving the problems on a long-term basis through construction of rapid underground transit or express ways, the seminar felt that considerable thought be given before undertaking such schemes.

As a long-term measure, it would be worthwhile, the seminar felt, to lay emphasis on decongesting the city. The opportunity presented by the development of new Bombay city across the harbour should be fully exploited, observed the conferees.

The delegates were appreciative of the expertise developed at this CSIR laboratory which had successfully completed the two major transportation research projects, costing over Rs 15 million. □

Silica and oxalic acid from paddy husk: CFRI-NCCI agreement to scale up process

An agreement for the development of a pilot plant to scale up the process for obtaining pure silica and oxalic acid from paddy husk was signed by Central Fuel Research Institute (CFRI), Dhanbad, and the National Coke and Chemicals India (NCCI), Barakar, on 11 July 1983 at CFRI. The process has been developed at this CSIR laboratory. The firm is registered as a small-scale industry of the Bihar government.

The CFRI process envisages utilization of waste, namely paddy husk, produced to the extent of 20 million tonnes per annum from the rice mills in the country.

The firm will have exclusive rights for commercialization of the process for three years after successful operation of the pilot plant (12.5 kg/batch) which may take nearly 18 months from now.

The process can recover pure silica from paddy husk, which is of the order of 20-22%, and also produces oxalic acid to the extent of 50% by weight of husk as byproduct.

The CFRI director Shri B.K. Mazumdar assured all help and cooperation from the institute for the development of the pilot plant, which is likely to be situated either at Dumka or at Jamtara in Bihar. This process has the potential to improve the economics of rice-milling industry and generating rural employment, as the CFRI director observed at the signing ceremony.

Shri K.N. Gupta, of NCCI, expressed the hope that though the process was licensed to him exclusively for three years, he was confident that such plants would come up in small towns and villages, once this firm attained commercial success. □

Winged bean technology for Ghana

The Central Food Technological Research Institute (CFTRI), Mysore, has designed and developed a plant (capacity, 0.5 tonne/hr) for dehulling winged bean. Fabricated by an engineering firm in Hyderabad for Food Research Institute (FRI), Accra, Ghana, the plant is based on the technology developed earlier by CFTRI for milling pulses.

A tropical legume of high protein content, winged bean has been recently introduced in Ghana. Work at FRI has shown the usefulness of the bean in improving the nutritive value of Ghanian diets, particularly weaning foods and baby foods. But the dehulling of the beans has been posing a great problem. The plant with all accessories is expected to be used at FRI for research and trial production of dehulled winged beans and other grain legumes.

A technologist from FRI was trained at this CSIR laboratory in the erection, running, and maintenance of the plant. □

CEERI's work on instrumentation for sugar industry appreciated at a seminar

For giving a lead to the modernization of sugar industry through the application of electronics technology, scientists of Central Electronics Engineering Research Institute (CEERI), Pilani, were complimented at a seminar. Held in Bangalore from 26 to 28 May, the seminar on 'Higher Technology for Sugarcane and Sugar Production' had been organized by the monthly *Maharashtra Sugar* in collaboration with CEERI and the South Indian Sugarcane and Sugar Technologists' Association.

The seminar, inaugurated by Karnataka's Minister of Agriculture, Shri B.L. Gowda, discussed the application of higher technology for

improving the production of sugarcane and sugar. The seminar was attended by about 100 scientists and sugar technologists from various parts of the country, besides CEERI scientists. Out of about 25 technical papers presented in the seminar, 10 were by CEERI scientists.

Dr S.N. Gundurao, ex-Director of National Sugar Institute, Kanpur, made a special mention, in his keynote address, of the achievements of CEERI in the field of electronic process control instrumentation for sugar industry. The CEERI's director, Dr Amarjit Singh, was honoured, among others, by the Karnataka minister for this CSIR laboratory's work which has earned the gratitude of the sugar industry. □

CECRI's consultancy on corrosion prevention at Tuticorin port

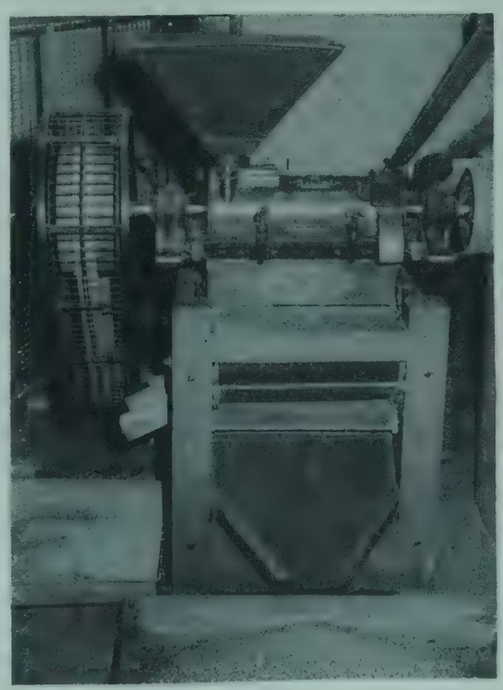
At the request of the Tuticorin port authorities, Central Electrochemical Research Institute (CECRI), Karaikudi, had undertaken a consultancy assignment on the protection of steel structures under wet and dry conditions prevailing in the Tuticorin port area. The port has its oil mooring berth in the north break water area of the port for pumping furnace oil, naphtha, and water to the shore from ships. The three mild steel pipelines of 457 mm, 356 mm and 200 mm diam. used for pumping over a length of 2.5 km to the storage tanks had been subjected to heavy splashing during north-east monsoon, and to heavy deposition of salt during summer. The pipes had been heavily corroded even after the application of some paints and maintenance painting.

The CECRI scientists made on-the-spot investigations, involving corrosion rate measurements, pollution levels, estimations, etc. and suggested suitable paint schemes, consisting of surface preparation, primer, under-coat and finish-coat applications with suitable paints.

The port authorities, having been satisfied with the results, requisitioned the services of CECRI as their consultants for implementing the paint scheme suggested by the institute. The entire pipelines and two towers were painted under the supervision of CECRI scientists. The paint scheme suggested by CECRI is performing well and the port authorities are satisfied with the consultancy work undertaken by CECRI. □

Rice huller for wheat cleaning

The commonly used rice huller, as a result of adjustments devised by Central Food Technological Research Institute (CFTRI), Mysore, can now be employed for removing extraneous matter like dust, chaff, stones and seeds of other kind from wheat in a single operation. A rotary sifter can also be used for this purpose but it is more expensive. Only the large-sized impurities are left after the cleaning operation and these can be removed quickly and easily by hand. A *chakki* (small grinder) operator, who is likely to have either a rice huller or a rotary sifter installed next to the *chakki*, can now offer with the present CFTRI innovation both the cleaning and grinding operations. While eliminating housewives' drudgery, the innovation could expedite the programme of modernization of rice mills. □



Rice 'huller' for wheat cleaning. This can remove about 85-90% of extraneous matter from wheat; only large-sized impurities are left, and these can be easily removed by hand.

Filaria skin test with *Brugia malayi* antigen

Filariasis is a major public health problem in tropical and sub-tropical regions of the world. In India the disease is caused mainly by two filarial worms, namely *Wuchereria bancrofti* and *Brugia malayi*. Over 236 million people are exposed to the risk of infection, 18 million people carry microfilariae (mf) in their blood, and about 14 million show chronic manifestation—grotesque deformity (elephantiasis) of dependent parts and hydrocele.

The diagnosis of filariasis is a problem. The most common and simple method of diagnosis is the demonstration of the presence of mf in the blood. But the mf of both *W. bancrofti* and *B. malayi*, being nocturnally periodic, appear in the peripheral blood only late at night. Taking blood samples at such a time is inconvenient to both investigator and patient. Moreover, this technique can detect only a small percentage of active mf carriers. Counting chamber and membrane filtration methods have many limitations. All these methods fail to identify prepatent and latent phases of infection which are essentially amicrofilaraemic. A serious drawback is that the detection of mf in the blood is only possible about a year after infection, and by this time enough damage would have been done to the patient. In the absence of proper diagnosis and treatment, the mf carriers continue to suffer and spread the disease.

In an alternative approach to actual demonstration of mf, immunological tests have been tried. Of these, the filaria skin test fulfils most of the criteria of an ideal test. But this test, based on the use of heterologous antigens made from

Dracunculus medinensis and *Dirofilaria immitis* very frequently gave non-specific and false positive reactions. Therefore, in recent years antigens from human filarial parasites have been tried. However, the difficulty in obtaining a large number of *W. bancrofti*, which cannot be cultivated in an animal host, severely restricts its use as a source of homologous antigen. With the recent development of an animal model of *B. malayi* infection, the preparation of large quantities of antigen from this human parasite has become possible.

The Central Drug Research Institute (CDRI), Lucknow, has been investigating for some time the possibility of detection of filariasis using a homologous antigen made from infective larvae and adult worms of *B. malayi*. It has been established that the infection can be maintained well in mastomys. A good crop of larvae can be harvested from mosquitoes fed on infected animals and repeated feedings are possible without any harm to mastomys. A comparative study has shown that the larval antigen made from *B. malayi* and *W. bancrofti* behave similarly in the skin test. Although adult worm antigen from *B. malayi* also gave similar results, because of the difficulty in extracting adult parasites from small animals, infective larvae are a more practicable source of antigen.

Field trials with the larval antigen have been carried out in more than 1200 subjects in filaria endemic and non-endemic areas with or without other helminth parasites. In the endemic zones, nearly all the 754 subjects found to be mf-positive and mf-negative by the blood test, gave positive skin reaction, indicating the sensitivity of the test with this antigen.

To establish specificity of the antigen indisputably, the FST trials were conducted in non-endemic areas from where there has not been to-and-fro movement of population to endemic places, and where the inhabitants were heavily infected with other helminths. In Srinagar (Kashmir), the antigen was tested on about 300 subjects, many of whom harboured *Ascaris*, but none of them was found positive for mf by blood examination. With larval antigen the skin reaction was negative except in three cases which were also negative for intestinal worms. The adult-worm antigen produced reaction in 20 subjects, of whom seven had *Ascaris*. The other filaria non-endemic area selected was a tribal belt in Udaipur district (Rajasthan), whose inhabitants were heavily infected with *Dracunculus medinensis*. This area was deliberately chosen since *D. medinensis* was earlier considered to be a filarial worm. There were some chances of cross-reaction with *B. malayi* antigen. However, of the 177 active dracontiasis cases, larval antigen caused skin reaction in only five cases and adult-worm antigen in four. The study in non-endemic areas clearly proves that *B. malayi* antigen is specific to filaria.

The results of FST indicate that there is no significant difference between the antigen prepared from the adult worm and infective larvae. There is also sufficient evidence of cross-reactivity between *B. malayi* and *W. bancrofti*. Thus, the highly sensitive *B. malayi* antigens can be used both in *W. bancrofti*- and *B. malayi*- infected cases. Of the two antigens, larval antigen is preferred because of its easy availability.

The skin test with *B. malayi* larval antigen proves a simple, quick and cheap method of diagnosis of filariasis. It can be used in individual patients as well as a population. A positive reaction in a patient in an endemic area, supported by clinical manifestations, is likely to help in definite diagnosis.

The researchers associated with the development of the filaria skin test are Dr A.B. Sen, Dr J.C. Katiyar, Dr (Smt) P.K. Murthy, all of CDRI, and Dr R. Chandra of K.G. Medical College, Lucknow. □

US energy expert visits CFRI

Dr John W. Tatom, an expert in alternative energy resources from Georgia, USA, visited Central Fuel Research Institute (CFRI), Dhanbad, in May 1983. Dr Tatom's expertise covers the areas of low-temperature carbonization (LTC), briquetting, domestic fuels, and fuels derived from agricultural wastes and biomass. The US scientist had visited this CSIR laboratory in March 1982 along with the representative of United Engineering Consultants of USA, deputed by USAID. to study technologies relating to LTC, pelletization, briquetting, domestic *chullah* (stove), etc.

The U.S. consulting engineer evinced interest in further development of the CFRI design of the domestic *chullah* so that coals of different countries like Pakistan, Indonesia, Tanzania, and other developing countries could be utilized. He was of the view that the CFRI *chullah*, which burns raw coal quite efficiently with reduced smoke emission, could be suitably adopted to burn fuels prepared from biomass and other agricultural wastes like saw dust, rice straw, and paddy husk. □

World Environment Day celebrations at CECRI and PID

The World Environment Day was celebrated on 6 June (5 June being Sunday), among other CSIR laboratories, . at Central Electrochemical Research Institute (CECRI), Karaikudi, and Publications & Information Directorate (PID), New Delhi. At CECRI, three lectures were arranged on different aspects of environmental protection followed by a film show on the subject. Shri N. Sangiliraj, Executive Engineer, TWAD, spoke on environmental hygiene. Dr R. Vijayavalli of CECRI discussed the application of electrochemical methods in pollution control, and Dr G. Prabhakara Rao, also of CECRI, gave a talk on pollution monitoring by electrochemical methods.

At PID, Dr D.C.S. Raju of Botanical Survey of India, Howarah, spoke on 'Plants and Man' and Dr P.K. Hazara, also of BSI, Dehra Dun, dealt with in his lecture the rare and endangered plants

of the Himalayas. Also, at the PID-NISTADS campus, 125 saplings were planted as part of the celebration. □

Fire-retardant thatch roofs undergo successful short-term tests

Manually pressed thatch panels using bamboo strips, *bhind* (a local reed), and non-erodable mud plaster developed by Central Building Research Institute (CBRI), Roorkee, subjected to fire tests on a short-term basis have given encouraging performance. Panels of 2 m × 2 m size were prepared with non-erodable mud plaster on both sides as well as only on one side. The panels with non-erodable mud plaster on both sides were not affected by the fire, but the surfaces of the panels having plaster only on the top were charred without any spread of fire. The spread of fire was automatically stopped after the loose thatch projecting from the panels got burnt. The panels without plaster in the bottom withstood the test for 1½ hr without any collapse. The panels are now being laid for long-term tests. □

Utilization of water hyacinth in treatment of tannery wastewater

The wastewaters discharged from tanning industry are among the most polluting of all the industrial wastes, and contain organic and inorganic pollutants in solution, suspension, and colloidal dispersion. They have a *p*H of 7-8 with BOD (biological oxygen demand) ranging from 2000 to 2500 mg/litre with a chromium content of 150 to 200 mg/litre.

The Central Leather Research Institute (CLRI), Madras, has studied, under a Commonwealth Science Council project, the utilization of water hyacinth in the treatment and disposal of tannery wastewater. Water hyacinth was grown in tanks so as to cover 60-70% of the surface area with different concentrations of tannery waste with a view to finding out at what dilution of tannery waste with sewage the growth of the plant would be normal with concomitant removal of BOD and chromium. The different concentrations of tannery waste in admixture with sewage used in these experiments were 20:80, 40:60, 60:40, 80:20 and 100:0.

Water hyacinth thrived well initially in all the concentrations, but began to show signs of decay after about 10 days in the last three higher concentrations of tannery waste. Retarted growth and decay of plants were observed in all the concentrations after a period of four weeks. The BOD removals in 16 days in the five concentrations, in the order given above, were 80%, 68%, 49%, 35%, and 20% respectively. Chromium was completely removed in 20:80 and 40:60 concentrations within 8 and 16 days respectively and in other higher concentrations, the removal was 60 to 80%. The results show that water hyacinth can be utilized for treatment of tannery wastewater in admixture with sewage. □

Recovery and utilization of nitrogen bases from coal carbonization byproducts

A process has been developed at Central Fuel Research Institute (CFRI), Dhanbad, for the production of pure pyridines and 2-picolines or a mixture of pyridine bases which conform to the specifications laid down by user industries, from the crude mixture of bases containing water, phenols, neutral oils, etc. The process consists in: (i) extraction of the crude bases with caustic soda to remove phenolics and part of water; (ii) azeotropic distillation with benzol to dehydrate the crude pyridine; and (iii) final purification by fractional distillation of the de-phenolized and dehydrated bases into either pure pyridine and 2-picoline or a mixture of pyridine and picolines.

The nitrogen heterocycles present in the byproducts of coal carbonization are valuable raw materials which are required by several industries such as dyestuffs, chemicals, and pharmaceuticals. The present demand, specially of pyridine bases, in the country is of the order of 1-2 thousand tonnes per annum, the bulk of which is met through synthetic routes of preparation and the rest through import.

There is provision for the recovery of crude bases without purification in the Bokaro Steel Plant. According to information available from this steel plant, it is possible to recover 120 tonnes of crude pyridine bases annually. After expansion in the second phase this is likely to go up to 240 tonnes. The method of recovery and purification has been worked out at CFRI on a laboratory bench scale.

The quality of the pyridine bases after processing conforms to the specification as laid down by dyestuff industry, which does not require pure pyridine. A mixture of pyridine bases with specified properties is required. For technical details, see *Research and Industry*, 27 (1982), 124-129. □

Utilization of aliphatic hydrocarbons by microorganisms

The utilization of aliphatic hydrocarbons by microorganisms has been studied by Shri P. Gopal Reddy at Regional Research Laboratory (RRL), Jorhat. Gaseous and volatile hydrocarbons, the study has shown, are taken up by microbial cells primarily through gaseous diffusion. Insoluble liquid hydrocarbons were, however, shown to be taken up by cells through a specific solubilizing system elaborated by the cells. The hydrocarbon-solubilizing factor produced by microbial cells was isolated and it was shown that the rate of solubilization by the factor was high enough to completely account for the rate of hydrocarbon uptake and growth of cells.

Shri Reddy, who carried out the study under the guidance of Dr J.N. Baruah, was awarded Ph.D. degree by University of Gauhati for his thesis based on the study. □

Production of heat-stable microbial amylase

Microbial enzymes are being commercially exploited to a great extent during the last few decades. α-Amylase is one such widely used industrial enzyme. Although most of the commercially used bacterial α-amylases can withstand a moderately high temperature (75°C), there has been interest in finding out amylases which can withstand higher temperatures. Amylases active at a temperature of 90-100°C have better application potentials in starch and starch-based industries.

Thermophilic microorganisms produce more thermostable enzymes than their mesophilic counterparts. Keeping this fact in view, a researcher, Shri Binod Kr Gogoi at Regional Research Laboratory, Jorhat, has attempted isolation of thermophilic bacteria which produce highly heat-stable extracellular α-amylase. After extensive screening, a strain of *Bacillus stearothermophilus* which could produce thermostable extracellular α-amylase was selected for further studies. The α-amylase produced showed a temperature optimum of 80°C. The enzyme was active over a wide range of *p*H 6-10.6. Conditions for the production and isolation of the enzyme were worked out. An attempt was made to enhance the heat stability of the α-amylase obtained by cross-linking the enzyme with glutaraldehyde, benzidine, 1,5-difluoro-2,4-dinitrobenzene, and 2,4-dichloro-6-carboxymethylamino-5-triazine. The α-amylase modified with glutaraldehyde showed better heat stability.

Shri Gogoi, who carried out the study under the guidance of Dr J.N. Baruah, was awarded Ph.D. degree by University of Gauhati for his thesis based on the study. □

Vegetation of Trikuta Hills of Jammu

Phyto-ecological studies of the vegetation of Trikuta Hills (Vaishno Devi (Hills), with special reference to the distribution pattern of economic plant products, have been made by a researcher, Shri Sushil Kumar Kapur, at Regional Research Laboratory, Jammu.

The structure and composition of vegetation were studied and delineated on the basis of important value indices. The effect of various ecological factors on the vegetation was studied and the life form composition of the flora of the area was determined. The net productivity and seasonal variation in the biomass of five economic species, viz. *Skimmia laureola*, *Selinum vaginatum*, *Dioscorea deltoidea*, *Viola odorata*, and *Valeriana jatamansi*, were also studied. The production of chir-pine and oak litter, their rate of decomposition and contribution to the nutrition budget in oak-conifer forests were also determined.

A systematic census of 125 economic plants associated with various communities was made, their distribution pattern studied, and yield per hectare of five forest products determined.

In all, 525 plant species belonging to 388 genera and 108 families were identified. Asteraceae tops the list followed by Fabaceae and Lamiaceae having more than 25 species. Life-form composition of flora depicts a therochamaephytic plant climate. High percentage of chamaephytes and eutherophytes is attributed to aridity and influence of biotic factors respectively.

Peak values of above-ground and subterranean biomass of four perennials studied were found to be during autumn months, while for annuals these were during May and July. Annual litter fall under pine consociation and oak-pine communities is 3.9 tonnes/ha and 4.1 tonnes/ha respectively. The low decomposition rate (13.75%) of pine litter is explained as due to dry conditions. The release of various nutrients is similar to that in temperate forests of Europe and North America.

Out of 125 plants of economic value enumerated, 16 are of major commercial value. Quantitative assessment of five such plants was done by using phytosociological methods. Study of distribution pattern of 66 minor forest products and evolving of a method for estimating yield per hectare for some of them are useful contributions to systematic exploitation of minor forest wealth.

Shri Kapur was awarded Ph.D. degree in botany by University of Jammu for his thesis based on the study made under the guidance of Dr Y.K. Sarin of RRL, Jammu. □

PROGRESS REPORTS

CMRS Annual Report : 1981-82

The activities of Central Mining Research Station (CMRS), Dhanbad, were pursued during 1981-82, according to its annual report for that period, brought out recently, under sixteen major projects in four sub-disciplines: Geomechanics and mining methods, Mine environment, Engineering design and development, and Miners' health.

Equivalent material mine model studies were conducted and the feasibility of working Hatnal coal seam underneath Disergarh seam stowed goaf and Damodar River was worked out. Investigations were carried out on the feasibility of partial/complete extraction below hard cover, seam on fire and surface structures in five mines, entailing substantial saving of coal. A support design was provided for a roadway in a mine under abutment pressure zone of a longwall panel and a stope design was recommended for a lead-zinc mine. Also, new pillar design equations were developed based on the triaxial strength of Indian coals.

Suitable, powered supports were recommended for the mechanized longwall extraction in Borachak seam of Dhemomain colliery. The support parameters at the proposed caved longwall face of Seetalpur colliery were determined. Similarly, the support resistance needed and the cavability were assessed at the proposed caved longwall face of Patherkera colliery.

The institute also examined the possibility of extracting Jhagrakhand B seam by knife-edge method taking into account the various problems endangering safety.

Geotechnical studies were carried out in the tunnels of Tehri Dam Project, Salal Hydel Project, and Khara Project. A close agreement between the predicted and measured values of rock pressure exhibited the validity of the rock mass classification system for generating design data.

Studies on bacterial mining showed that uranium sludge contained *Thiobacillus ferrooxidans* and *T. thiooxidans* which were fairly active and could be used for oxidizing iron and sulphur. Optimum conditions were determined for the growth of methane-oxidizing bacteria and isolating the co-oxidizing bacteria. It was found that 0.0186g ammonia, 0.0106g phosphorus and 0.2054g sulphate were consumed per litre of methane oxidized by methane-oxidizing bacteria. At Swang colliery, the total emission of methane from a specific area declined from 0.53 to 0.14 m^3/min. because of the injection of bacteria.

A project on the application of CO_2 and other inert gases to deal with underground mine fire was successfully completed. Also studied were the safe stacking characteristics of coal, spontaneous combustion of coal and its prevention in coal seams, and assessment of the condition of fire behind fire stoppings.

Air pollution hazards were studied at Rourkela and Bhilai steel plants and at a lead smelter. Many equipment were designed and developed; these included: open-type hydraulic prop, hydraulic sliding-type roof bar, screw-type props with friction/hydraulic yield, light-duty screw-type rigid steel prop with slide bars head, and steel chock with quick-setting and release mechanism.

Studies in the discipline of miners' health related to lead poisoning among the workers of a lead smelter, propagation of intestinal parasites in coal dust, and pneumoconiosis.

Ten papers were published, and 16 were presented in symposia. In all 92 consultancy jobs were completed. □

CSIR Patents Unit Report: 1979-80 to 1981-82

As many as 310 patents were filed in India by the CSIR constituents during the period 1979-80 to 1981-82; 119 CSIR patents were accepted and 195 patents were sealed. The Central Electrochemical Research Institute, Karaikudi, had the maximum contribution (number of patents filed, 76; accepted, 22; sealed, 44) followed by National Chemical Laboratory, Pune (41, 14, 11) and Central Drug Research Institute, Lucknow (31, 7, 13). Other major contributors included: Indian Institute of Petroleum, Dehra Dun (15, 5, 7); Central Electronics Engineering Research Institute, Pilani (14, 2, 5); Central Mechanical Engineering Research Institute, Durgapur (13, 8, 19); Regional Research Laboratory (RRL), Hyderabad (12, 4, 6); RRL, Bhubaneswar (10, 11, 18); and Central Mining Research Station, Dhanbad (10, 4, 5). This information is revealed in the report of the CSIR Patents Unit published recently. The report (74 pages) also reveals that of the 119 accepted patents, 61% were in the field of 'chemistry and metallurgy' (International Patent Classification) and 15% belonged to 'performing operations'. As many as 1230 patents running during the various periods of their terms were renewed. Twenty patents were filed abroad, and of these, 12 stand to the credit of RRL, Bhubaneswar. □

ITRC Foundation Day Addresses: 1978-82

The Industrial Toxicology Research Centre (ITRC), Lucknow, has brought out a compilation of its Foundation Day lectures and reports for the period 1978-1982. The publication covers the addresses by: Dr Frank I. Lee, Victoria Hospital, UK (1978); Prof. Ernst G. Beck, Justus Liebig University, FRG (1979); Prof. Ivo Brettschneider, Institute of Experimental Medicine, Prague, Czechoslovakia (1980); Prof. Friedrich J. Wiebel, Institute of Toxicology and Biochemistry, Neuherberg, Munich, FRG (1981); and Dr Shantilal J. Mehta, Jaslok Hospital, Bombay (1982). It also contains reports for the respective years presented by the then ITRC director, Dr C.R. Krishna Murti.

The publication may be obtained from: The Scientist in charge, ITRC, Lucknow 226 001. □

CONFERENCE BRIEFS

International Meeting on Photoacoustic and Photothermal Spectroscopy

The photoacoustic technique has been making rapid strides since 1973, and has been applied to the study of optical spectra, thermal parameters and depth profiling of molecules in condensed phases such as solids, surfaces, gels, and intact biological specimens. When intensity-modulated light falls on the sample, causing absorption and non-radioative decay, the emitted heat is also modulated. Consequently, the gas in contact with the surface of the sample undergoes pressure oscillations (leading to an acoustic signal output, the PA effect) and periodic thermal expansion (the PT effect). Since the detection mode is either acoustic (PAS), or of the refractive index changes (the mirage effect) by interferometry or by piezoelectric means (PTS), opaque samples are handled more easily here than by conventional optical spectroscopy.

Prof. D. Balasubramanian, of Centre for Cellular and Molecular Biology (CCMB), Hyderabad, who attended the International Topical Meeting on Photoacoustic and Photothermal Spectroscopy, held in Paris, France, during 5-8 April, reports:

This was the third in a series of biennial meetings, wherein workers in the two areas exchange their results, evaluate each other's work, discuss the

state of the art in the fields, and initiate new projects and collaborations. The meeting was attended by about 100 workers from USA, UK, France, Germany, USSR, India, China, Japan, Hungary, Israel, and Latin American countries.

The advances made in the past three years in the methods of detecting the mirage effect using probe laser beams, piezoelectric transducers, and interferometry were discussed in the meeting. The use of PTS, and, in particular, of pulsed photoacoustic piezoelectric detection in remote sensing was demonstrated by several workers. Another application of PTS of great promise is that of thermal wave imaging, introduced months ago, where a three-dimensional reconstruction of the photothermal output from samples such as integrated circuit chips offers information about subsurface defects, cracks, and dislocations.

The application of the PAS method to biological systems was another important presentation at the meeting. The CCMB scientist presented his work (with Ch. Mohan Rao and B. Panijpan) on the use of PAS to study the malaria parasite *Plasmodium* directly. This technique has enabled them to characterize the state in which the parasite stores the heme that results after the microorganisn metabolizes the host cell hemoglobin. Their results have suggested that endogenous hemin occurs as self-aggregates, as a noncovalent protein-sequestered form called the malaria pigment and as some residual hemoglobin. The PAS of drug-treated parasites indicated an *in vivo* interaction between the added chloroquine-class of drugs and endogenous hemin. This direct look at the microorganism supports the idea of the formation of a hemin-drug complex which is toxic to the parasite, since it causes membrane lysis. The mode of action of antimalarial drugs thus becomes clearer by this study. In support of this is their finding that chloroquine-resistant strains of *Plasmodium* do not appear to degrade hemoglobin down to a level where hemin becomes accessible for complexation with the drug. This contribution was highlighted as an example of the novel application of this new, non-invasive spectral method in molecular medicine. □

Workshop on Proterozoic Basin

Dr S. Balakrishna of National Geophysical Research Institute (NGRI), Hyderabad, visited USA from 20 May to 3 June 1983 to participate in a workshop on Proterozoic Basin organized (20-29 May) by the Department of Geology of Brooklyn College, City University of New York, and to hold discussions with scientists working in the field of his interests. At the workshop the NGRI scientist presented two papers: Geophysical investigations in the Cuddapah Basin, and Geology and mineral resources of Cuddapah Basin. He also presented a monograph on 'Evolution of Intracratonic Cuddapah Basin, South India'.

The CSIR scientist held discussions with Prof. S. Bhattacharji of Brooklyn College and Dr Norman Paterson of UNDP on problems to be tackled in the Cuddapah Basin. With Prof. Robert Phinney and Dr K.R. Chowdhury of Princeton University Dr Balakrishna discussed the reinterpretation of two DSS profiles across the Cuddapah Basin and the marine geophysical work to be taken up by NGRI. During his discussions with Dr H.M. Iyer of US Geological Survey, Dr Iyer suggested the setting up of an array of stations at Srisailam and Nagarjuna Sagar dam sites for strengthening the present seismic monitoring systems, reports the NGRI scientist. □

PERSONNEL NEWS

Appointments/Promotions

Dr A.G. Datta

Dr Asoke G. Datta, Scientist EII, Indian Institute of Chemical Biology (IICB), Calcutta, has been appointed, on promotion, Scientist F (14 Feb. 1983).

Dr Datta (born 20 Jan. 1928) after obtaining his Ph.D. degree from Calcutta University worked as a postdoctoral fellow at National Research Council of Canada. Here, he proposed a new alternative pathway of carbohydrate metabolism in *Aceto-*

bacter melanoginum. Moving to USA in 1957, he worked with the famous enzyme chemist Dr Efraim Racker at Public Health Research Institute of the City of New York on mechanisms of enzyme action.

Returning to India, he worked as a Pool Officer at Bose Institute, Calcutta, before joining this CSIR laboratory. His major contribution is the discovery of a new pathway of thyroxine biosynthesis in an extrathyroidal tissue, like the submaxillary gland.

Dr Datta has more than 80 publications to his credit, about 20 students have obtained Ph.D. under his guidance. He is a fellow of both Indian Academy of Sciences, Bangalore, and Indian National Science Academy and also a recipient of the B.N. Chopra Award for 1980 of INSA. He has twice been invited as Visiting Scientist by Roche Institute of Molecular Biology, USA, and once as Visiting Professor by Ohio State University at Columbus, USA.

Dr Datta's current research interests include utilization of waste materials, thyroxine biosynthesis, and enzymology. □

Dr Yash Pal

Dr Yash Pal, Chief Consultant, Planning Commission, New Delhi, has been nominated a member of the Society (CSIR) till 5 June 1984. □

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Sagar Kanya: a new oceanographic research vessel for NIO

India's second oceanographic research vessel *Sagar Kanya*, acquired by the Department of Ocean Development of the Government of India from FRG, was handed over to National Institute of Oceanography (NIO) on its arrival in Goa on 27 June 1983.

At a formal function held at Mormugao harbour, Dr S.Z. Qasim, Secretary, Department of Ocean Development, described the ship as a floating laboratory to undertake work in any discipline of oceanography. Appreciating the efforts and cooperation of the FRG government, Dr Qasim said that *Sagar Kanya* was one of the finest examples of Indo-German cooperation. Lt Governor of Goa, Daman and Diu, Shri K.T. Satarwala, who was the chief guest, expressed the hope that the ship would help unravel the many hidden mysteries of the sea and that this CSIR laboratory would make good use of it. Mr Rolf Ramisch, FRG's Ambassador to India, while thanking the Indian authorities on behalf of his government, wished NIO a great success. Others who spoke on the occasion were Dr T.S.S. Rao, chief scientist for the second and third trial cruises (the first trial cruise undertaken in the Baltic Sea was led by NIO's director Dr V.V.R. Varadachari), and Mr Peter Otten from Germany who was the scientific coordinator for the project on the German side.

A workshop was also organized at NIO on 28 June at which many Indian and German scientists who participated in the cruises from Germany to India presented their preliminary findings in various disciplines of oceanography.

India's second research vessel Sagar Kanya—Acquired by the Department of Ocean Development from FRG and handed over to NIO, the vessel has all advanced instruments for navigation and for scientific work in all disciplines of oceanography. Equipped with active stabilization, she is capable of operating under all weather conditions.

The Vessel

This multi-disciplinary oceanographic research vessel is the result of almost six years of joint efforts of Indian and German engineers, scientists and technicians within the framework of the Indo-German Economic Cooperation.

The keel of the ship was laid in early September 1981 at Schlichting-Werft, Travemunde, FRG, under an order from India's Department of Ocean Development. After the construction period of 19 months, the research vessel

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was delivered at Travemunde to the Indian government on 25 March this year. The vessel left Travemunde on 12 April and after completing the trial cruises during which all the equipment on board had been thoroughly tested, she arrived at Bombay on 24 June and at Mormugao harbour, Goa, on 27 June.

Sagar Kanya is one of the most modern multi-purpose oceanographic research vessels of the world. With all advanced instruments for navigation and scientific work, the vessel enables research in all the disciplines of oceanography. Equipped with active stabilization, she is capable of operating under all weather conditions. She has an endurance of 45 days out at sea on a cruising range of 10,000 nautical miles.

The main particulars of the ship are:

Length overall	100.34 m
Length between perpendiculars	89.00 m
Breadth overall	16.39 m
Depth to main deck	9.80 m
Draught	5.60 m
Deadweight	1554.5 dwt
Gross tonnage	4209 RT
Net tonnage	1094 RT
Engine output	2 x 1230 kW
Speed	14.25 knots

Fully airconditioned, the ship has accommodation for 59 officers and crew, 24 scientists, and 8 technicians; she is at present run by the Shipping Corporation of India.

Propelled by twin-screw, each connected to a tandem-type electric propulsion motor, the vessel is equipped with fin stabilizers, two fin rudders, and one bow thruster to achieve the best possible manoeuvrability and stability under all sea-going conditions.

The vessel has a total of 13 laboratories spread over three decks and various other additional work spaces. The laboratories are equipped with the most modern equipment required for carrying out shipboard research in geology, geophysics, meteorology, physical oceanography, chemical oceanography, and marine biology. There are three computer systems on board, one for general purpose, one for meteorology, and one for the integrated navigation system.

Two life boats with a capacity of 47 persons each and with propulsion motors of 14 hp and two survey-cum-life boats with a capacity of 45 persons each form part of the vessel.

Owned by the Department of Ocean Development, the vessel is utilized by NIO, whose research capabilities for undertaking oceanographic research in deep ocean, would naturally expand.

Shri Shivraj Patil, Union Minister of State for Science and Technology, visited NIO on 1 July and the newly acquired research vessel the following day and acquainted himself with this CSIR laboratory's work. □

President visits RRL-Hyderabad and CCMB

The President of India, Shri Zail Singh, visited Regional Research Laboratory (RRL) and Centre for Cellular and Molecular Biology (CCMB), Hyderabad, on 23 July. Going round the various laboratories and pilot plants, the President showed keen interest in the work being carried out. Shri Zail Singh was also apprised of the work done and being done in the areas of drugs, pesticides, oils and fats, surface coatings, speciality papers, coal processing, mineral products, industrial ceramics, computer applications, and cellular and molecular biology. A slide show on commercial plants which have gone on stream on the basis of the work of RRL-Hyderabad, such as the low-temperature coal carbonization plant, Sudarshan Pesticides Complex, and Glyoxal Plant, was organized on the occasion.

While appreciating the work being done in CSIR laboratories, Shri Zail Singh suggested that the laboratories should make greater efforts to publicize their achievements through various media so as to bring them to the knowledge of the people at large. □

To the President of India Shri Zail Singh (in white) Dr G.S. Sidhu, Director General of CSIR, is explaining the work of RRL-Hyderabad on pesticides. The RRL's director Dr G. Thyagarajan is in the extreme left

UN University workshop at CFTRI calls for a boost to traditional food technologies

A United Nations University-organized workshop at Central Food Technological Research Institute (CFTRI), Mysore, held from 18 to 26 July recommended that traditional food technologies in developing countries be placed on a sound foundation by scaling them up to a viable level through the application of science and emerging technologies. This goal could be achieved by intensified efforts at national levels and through a cooperative network of research and development projects among developing countries, the workshop pointed out.

It also suggested that basic research with long-range objectives, both for upgrading technologies and for developing new ones, needs to be encouraged. Some of the other, more important suggestions and recommendations:

So that traditional foods could be modified to meet the changing needs of society without creating imbalances, it would be desirable to carefully study social, economic, anthropological and ecological conditions that led to the development of traditional technologies at different periods of history.

In developing new technologies and modifying the existing ones, attention should be paid not only to cut down the energy use in conventional food-processing technology but also to develop new technologies for using non-conventional as well as renewable sources of energy.

One of the major requirements of building any effective system for R & D is to provide need-based information to different users such as research and development workers, policy-makers, technology users, extension workers, and consumers. Such a system could be designed as a part of the total information system on food science and technology activities in developing countries.

Non-conventional food resources with high nutritional potential should be utilized in the production of traditional foods to meet the qualitative and quantitative increase in food requirements.

Future training needs to be based on a balanced mix of socio-industrial sciences as well as technology. The type of training offered by the UN University should be strengthened substantially in the field of food and biotechnology with a background of social sciences. If such a training is not provided at present in any single institution, an inter-institutional training programme should be created. Training should be organized at centres of excellence, preferably within the developing countries where working conditions are similar to those obtaining in places where trained personnel will have to work.

Training is needed at advanced, intermediate and artisan levels to meet the requirements of human resources for building up a sound traditional food-based industry. The design and development of new equipment and adaptation of available equipment so as to improve traditional technologies, and make them economically viable, have not received adequate attention, and this lacuna has to be filled, noted the workshop.

Special recognition should be given to scientists who carry out R & D work on traditional technologies so that their contributions are at par with those of scientists working on non-traditional foods. Development of small/medium scale industries based on technologies developed in national institutions or through cooperation between nations would need special incentives such as liberal licensing, tax holidays, export incentives, and exemption from imposition of duties on their products.

Based on a survey of information and knowledge available, a compendium of traditional technologies should be prepared and made available to the participating institutions and others.

The workshop was attended by 37 participants from 22 countries of Africa, Asia and Latin America, besides scientists from Canada, The Netherlands, Hungary, and USA. Also represented at the meet were the United Nations agencies including UN University, UNICEF, FAO, and ESCAP. □

CECRI get-together with electroplating and metal-finishing industries

A get-together with electroplating and metal-finishing industries was organized by Central Electrochemical Research Institute, Karaikudi, at Bombay, on 20 May in collaboration with Metal Finishers' Association of India (MFAI), Bombay, and American Society for Metals (India Chapter—ASM-I), Bombay. More than 150 entrepreneurs and representatives of electroplating and metal-finishing industries attended.

The inaugural session, in which Shri M.M. Mehta, president of MFAI and chairman of ASM-I, Shri Mahesh Goenka, Director, Grauer & Yweil Ltd, Bombay, Shri M.I. Patel, chairman, Patel Extrusion Groups, Bombay, and Dr K.S. Rajagopalan, CECRI's director, delivered addresses, was followed by three technical sessions. In the first session the CECRI scientists highlighted their contributions in the field of electroplating and metal-finishing. The questions raised by the participants were attended to by the CECRI scientists in the second session. These related mainly to : electro-polishing of stainless steel, electro-polishing-mechnical polishing, copper plating of aluminium busbars, colouring of stainless steel, zinc plating, brush plating, quality of water for plating, destruction of cyanide electrochemically, hydrogen embrittlement in chromium plating, hard chromium plating, adhesion testing, electroless plating, electroform-

ing, anodizing of aluminium, composite coatings, and conversion coatings.

The CECRI director informed the gathering in the third session that this CSIR laboratory was compiling a handbook on electroplating for use by small entrepreneurs, and that CECRI was likely to establish an extension centre at Bombay in the near future. □

Stabilized coal-oil slurry

Coal is more abundantly available in India than petroleum whose indigenous production is much too inadequate, the country spending huge amounts in foreign exchange to augment the supply of petroleum. But substitution of oil by coal is beset with several problems, such as its storage, handling, burning, and the equipment that go with it. Converting coal totally to a liquid or gas, though feasible, is highly capital-intensive, besides requiring sophisticated process controls. Hence a coal-oil mixture (slurry) would be the obvious choice, particularly in order to replace, thereby conserve, fuel oil — a product of petroleum refining.

Though the coal-oil slurry idea is not new, the commercial application of coal-oil mixture (COM) poses several problems. For example, coal particles settle out of the suspension, leading to problems of storage, pumping, and injection. In order to get round this problem, Central Fuel Research Institute (CFRI), Dhanbad, developed a process for the production of a stabilized coal-oil composite fuel, using a selective type of surface-active additive. This composite fuel, designated as CARBOIL, has all the characteristics of a liquid with regard to its storage, transportation and usage for boiler furnace, blast-furnace foundry practice, open-hearth furnace, and so on.

Under a multi-agency national project, work is being done by Central Mechanical Engineering Research Institute (CMERI), Durgapur, Steel Authority of India and Central Mine Planning and Design Institute, besides CFRI, which is also coordinating the work.

At CMERI, CARBOIL flame was studied in two furnaces — tilting furnace and baking furnace. The difference in flames between fuel oil and CARBOIL was quite noticeable. In the tilting furnace, a higher fuel feed rate and air-fuel ratio were observed, besides a considerably higher flame temperature (by 100°C at 960°C). In the baking furnace, though quantitative measurements have not been made, the CARBOIL flame was relatively longer and more distinct, the unburnt carbon being negligible.

Optimization of parameters and efficiency studies will be undertaken in an experimental furnace, to be installed shortly. An application for a patent on the stabilization of the coal slurry system has been filed. □

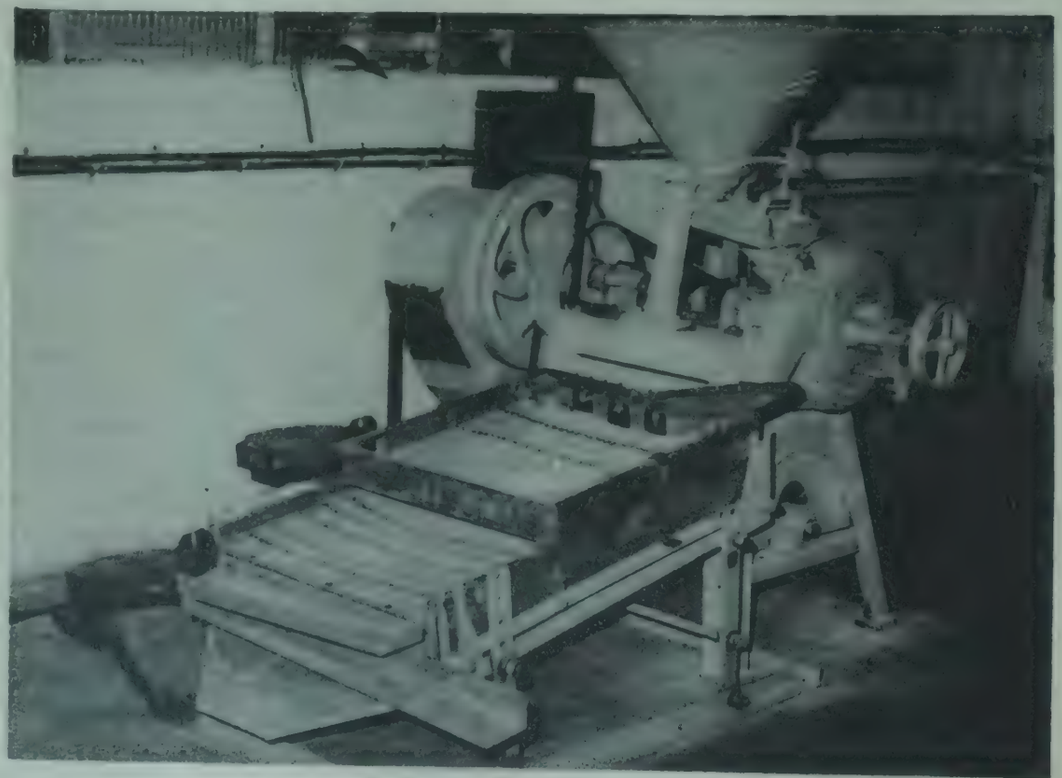
Unit for dehusking and grinding of foodgrains

The Central Food Technological Research Institute (CFTRI), Mysore, has evolved a simplified process to dehusk and grind foodgrains simultaneously by making certain additions or modifications to the ordinary, plate-type grinder (*chakki*), which is extensively used for grinding food materials.

The grinder (100 kg/hr capacity) is fitted with a multi-deck sifter and an aspirator which are operated from the same motor of the grinder. This unit is capable of removing 90-95% of the bran present in foodgrains and can grind the grain into flour and *soji* (semolina) which are of high nutritive value. The grains are wetted with a very small amount of water before grinding. The unit has been successfully tested with jowar, maize, bajra, and wheat. The commercial model of this unit is expected to be ready shortly. □

Cytogenetical studies in *Nymphaea* and *Costus*

The nature of cytogenetic mechanisms underlying the origin and evolution, together with morphological variation, breeding and meiotic systems, rectification of sterility and cytogeography of the garden nymphaeas has



The unit for dehusking and grinding foodgrains evolved by CFTRI. The grinder (capacity, 100 kg/hr) is capable of removing 90-95% of bran present in foodgrains.

been studied by a researcher, Shri G.V. Subrahmanyam, at National Botanical Research Institute, Lucknow. The genetic evolutionary race history has also been traced. Following experimental hybridization between various species/cultivars, both at intra- and inter-ploidal levels, the researcher evolved new cultivars by employing better parents.

The cytological analysis of 6 species and 30 cultivars revealed the existence of a polyploid series of $2x$, $3x$, $4x$, $6x$, $8x$, and $11x$, based on $x=14$. Besides, one of the cultivars was found to be an aneuploid, with $2n=15x-4=206$, and another cultivar, 'Director G.T. Moore', to be trisomic, with $2n=28+1$. No correlation was found between the size of the flower and the ploidy level as the genus *Nymphaea* is self- as well as cross-pollinated. The correlation of ploidy with the general geographical distribution of *Nymphaea* revealed that the diploids, which form the core, occur in Africa and India, while the polyploid taxa occupy a much larger area and hence are adapted to more diverse climates. Fertility could be restored through induction of polyploidy in a sterile triploid cultivar *N.* × *daubeniana* Hort. This opens up a new avenue for broadening the germplasm base by inclusion in the breeding programme of cultivars previously out of reach of *Nymphaea* breeders. Detailed analysis of the meiotic system in the genus showed its taxa to be allopolyploid in character.

The researcher also made cytological and morphological analysis of a number of collections of *Costus speciosus* from different geographic regions in India and two other species, namely *C. malortieanus*, H. Wendel and *C. megalobractea* K. Schum. and experimental hybridization. *C. speciosus* contained three intra-specific chromosomal races, namely diploid ($2n=18$), triploid ($2n=27$), and tetraploid ($2n=36$). This taxon was studied from a cytogeographic angle and the conclusion is that materials originating from different geographic regions in India have different ploidy levels. Intra-specific triploid hybrids ($2n=36$) were obtained by crossing the natural tetraploid and diploid *C. speciosus*.

An important conclusion of the study is that polyploidy and structural changes of the chromosomes have played an important role in the evolution of the genus.

Shri Subrahmanyam, who worked under the guidance of Dr T.N. Khoshoo, was awarded Ph.D. degree by Aligarh Muslim University, Aligarh, for his thesis based on the study. □

Polyamide membranes for reverse osmosis

Aromatic polyamide membranes have been found to be superior to cellulosic membranes in the reverse osmosis applications, and various polyamides are being tried for making still better membranes. At Central Salt & Marine Chemicals Research Institute (CSMCRI), Bhavnagar, Shri D.R. Korat has synthesized, on a laboratory scale, poly(metaphenyleneterephthalamide) and studied its dense membrane characteristics vis-a-vis the secondary cellulose acetate dense membrane. The researcher also studied the technique of fabrication of osmotic flat membrane of the polyamide and compared its high-pressure performance and other characteristics with those of the osmotic flat cellulose acetate membrane. The amide membrane was found to be as good as the secondary cellulose acetate membrane. The former is also expected to be superior in biochemical resistance to the cellulose acetate membrane.

Shri Korat was awarded Ph.D. degree by Bhavnagar University for his thesis based on the study. He worked under the guidance of Dr M.V. Chandorikar of CSMCRI. □

Cytological and molecular biological studies in plant genomes

With a view to assessing the role of different molecular parameters in determining the organization of chromatin at interphase, Shri C.P. Joshi of National Chemical Laboratory (NCL), Pune, has made cytological studies of plant chromosomes. Molecular characterization of DNAs of a number of plant species was carried out to estimate the proportions of DNAs of different frequency classes.

A new HCl-Giemsa chromosome banding technique was developed. It is simple, rapid and reproducible, and is generally applicable to a wide range of plant species. The technique was used to study interphase nuclear organization in more than 40 plant species including those with short chromosomes. Distinct types of nuclear organization were recognized in different plant species, the two main types being reticulate and chromocentric.

The mechanism of the HCl-Giemsa technique was investigated by using light, phase-contrast and fluorescence microscopy. Selective resistance of heterochromatin to acid disruption has been proposed to be the cause of chromosome banding.

DNA content was measured by Feulgen cytophotometry in 20 plant species and repetitive DNA content was estimated in nine plant species by hydroxyapatite column chromatography. Based on the cytological and molecular biological work the following trends were observed:

Plants with chromocentric nuclei were characterized by a small genome size (<4 pg), a low proportion of total repetitive DNA (27-52%), a narrow range of variation in highly repetitive DNA (7-20%) and a broad range of variation in moderately repetitive DNA (10-51%). These showed less than 2.5×10^{-13} g of DNA per chromosome, a small chromosome size, and fewer bands on dividing chromosomes by HCl-Giemsa banding.

Plants with reticulate nuclei, on the other hand, had a large a genome size (>4 pg), a high percentage of total repetitive DNA (52-85%), a wide range of variation in highly (9-34%) and inter-

mediately repetitive DNA (24-73%) fractions, and large chromosomes. The DNA content per chromosome was more than 2.5×10^{-13}g.

Shri Joshi, who carried out the investigation under the guidance of Dr P.K. Ranjekar of NCL, was awarded Ph.D. degree of Poona University for his thesis based on the studies. □

Cellulolytic enzymes from *Sclerotium rolfsii*

Studies on the isolation, purification and characterization of the cellulolytic enzymes from *Sclerotium rolfsii* have been carried out at National Chemical Laboratory (NCL), Pune. The researcher, Shri A.H. Lachke, has purified two endo-(1→4)-β-D-glucanases to homogeneity from the culture, and has determined some of the physicochemical and enzymatic properties. One of the endo-D-glucanases was found to be composed of a single polypeptide chain whereas the other had two dissimilar polypeptide chains bonded covalently by a disulphide bridge. The enzymes exhibited a difference in the preferred mode of attack.

The specificity of *S. rolfsii* endo-D-glucanases was found to be restricted to β-(1→4) linkages. The purified enzymes showed very little capacity to hydrolyze microcrystalline cellulose, Avicel Cellulose-123, filter paper α-cellulose but attacked partially disordered and highly hydrated celluloses such as phosphoric acid- and alkali-swollen celluloses, cello-oligosaccharides, cellodextrins, and lichenan.

The major ultimate end products of H_3PO_4-cellulose, lichenan, and cellodextrins were cellotriose, cellobiose, and small quantities of glucose. The specificity region of the endo-D-glucanases was at least five glucose units in length.

The two endo-D-glucanases differed in their randomness of attack on carboxymethylcellulose. One of the endo-D-glucanases also showed endoxylanase activity. The xylan-hydrolyzing capacity is an inherent feature of the cellulase protein. The two substrates, carboxymethylcellulose and xylan, were hydrolyzed at two different sites.

Shri Lachke was awarded Ph.D. degree of the Poona University for his thesis based on the studies. He worked under the guidance of Dr J.C. Sadana, Emeritus Scientist at NCL. □

PROGRESS REPORTS

CFTRI-Mysore Annual Report: 1981-82

The annual report of Central Food Technological Research Institute (CFTRI), Mysore, for the period 1981-82, shows that 23 processes were released to 38 parties for commercial utilization. Of these, six, namely rice bran stabilizer, papain I.P. and concentrate, cashew apple juice blends, cocoa butter and powder, concentrated meat gravies, and alcohol from tapioca, were released for the first time.

Concentrated meat gravy, survival ration, and fruit bars were produced at the institute and supplied to the members of the Antarctica expedition.

A hand-operated hydraulic press for extraction of cocoa butter from cocoa was developed. The equipment costs about Rs 2000 per unit. A number of such units have been installed by a firm manufacturing chocolate. Fabrication details and operating procedures are available for entrepreneurs.

Extraction, purification and properties of plant-based gums were studied to exploit them for food applications. The wet process yielded 32-34% of pure guar gum containing 86-87% galactomannan and 8-9% moisture. Guar gum improved the stability and resistance-to-extension of soft wheat dough besides modifying the pasting characteristics of rice, wheat, *ragi*, and maize starches. Pure *Sesbania aculeata* gum containing 89% galactomannan could also be obtained in yields of 34-35% by wet-processing.

Spices and their products are export items but face stiff safety specifications of importing countries and international health regulatory agencies. Effects of capsaicin (bite principle of chilli), curcumin (present in turmeric) and garlic on the physiological functions, histology, and tissue composition of rats were studied to assess their safety.

A comprehensive programme of assessing the toxicity of pesticidal chemicals and fungicides was under way. The products evaluated included ethion, dimethoate, Warfarin, Cypermethrin, and Silmurin.

Bacterial insecticides using the spores of *Bacillus thuringiensis* grown on sporogenic media proved effective in destroying lepidopterous pests of foodgrains.

Indiscriminate raising of fruits and vegetable crops in soils contaminated with BHC or other pesticides, it is well known, leads to the risk of pesticide residues in edible parts. Studies in infestation control have shown that bacterial degradation of HCH (BHC) prevents the inhibition of soil dehydrogenases and offers protection to amaranths, knol-khol and tomato seedlings against HCH toxicity.

To control environmental pollution and health hazards, it is necessary that pesticidal chemicals be selective, non-residual, biodegradable and safe to humans and higher animals. A new pathway could be established for the synthesis of Bromophos from non-insecticidal isomers of BHC. The product was comparable in quality with EPA-grade Bromophos.

Work on unconventional/inedible seeds was continued. Tamarind seed proteins could be extracted to the extent of 75% by using suitable solvent systems at alkaline *p*H. This concentrate possesses a high foam stability at low *p*H. This characteristic could be exploited for preparing certain beverages. Two weaning food formulations containing more than 20% protein and biscuits with about 15% protein could be prepared by using the mustard protein concentrate.

In the area of packaging of food products, a prototype box (250 mm

cube) was fabricated by using date palm leaf for testing as transport packages.

Two new designs of composite packing cases (with wood, corrugated fibre board, palmyra mat) for apple transportation were worked out. In simulated transportation trials the container with 38 kg load could survive the severity of a 0.6 m drop without damage. Prototype designs were under evaluation in Himachal Pradesh.

Project/feasibility reports for as many as 11 different industries based on food materials were prepared on payment. A comprehensive report on post-harvest quality losses of foodgrains was prepared for FAO under a consultancy programme. A review of the R&D work of the institute during the last three decades was also compiled.

Analysis of food products for aflatoxin and heavy metallic contaminants was carried out under the FAO-UNEP Indo-Nepal project on food contaminant programme.

Technical assistance for manufacture and marketing of products was provided to entrepreneurs to whom the institute's processes were released. Some of these relate to: demonstration of the production of fungal amyloglucosidase; pilot production of, and training of technical personnel for, the manufacture of liquid fruits; setting up and commissioning of units for manufacturing orange and lime/lemon flavoured soft drink beverages (capacity, 5000 and 10,000 bottles per day); planning/designing/training of technical personnel for a 5-tonne per shift capacity fruit and vegetable processing unit (pineapple, mango, citrus, and green pepper) with a modern quality control laboratory; erection /commissioning/trial production of a one tonne per day capacity tamarind powder manufacturing unit; and so on. □

Current Research Projects in CSIR Laboratories : 1981

The Indian National Scientific Documentation Centre (INSDOC), New Delhi, has brought out a directory of research projects being pursued in CSIR constituents. The compilation includes 1708 ongoing research projects in 37 laboratories and cooperative research associations. The projects are grouped under eight sections: General, Physical sciences, Biosciences, Engineering, Agriculture, Management and transport, Chemical technology & metallurgy, and Manufacture, industries, building and architecture. Each entry contains the following elements: serial number; title of the project; names of the project leader and other investigators; laboratory; sponsoring body; and duration and a brief description of the project. Investigator, keyword and sponsor indexes are provided. A list of laboratory-wise projects arranged according to their coordination councils is also appended.

The software package for processing the data through computer was developed at INSDOC. The data have been partly processed on Cyber System 170/720 installed at National Informatics Centre. Data inputing/listing, processing and final output in page format were obtained with the help of HP-1000 system. The entire data are stored in machine-readable form for future use.

The directory (A4 394 pages) can be had from: The Scientist in charge, INSDOC, Satsang Vihar Marg, New Delhi 110 067. □

PATENTS INFORMATION

Indian Pat. 61/Del/83 (Filed)

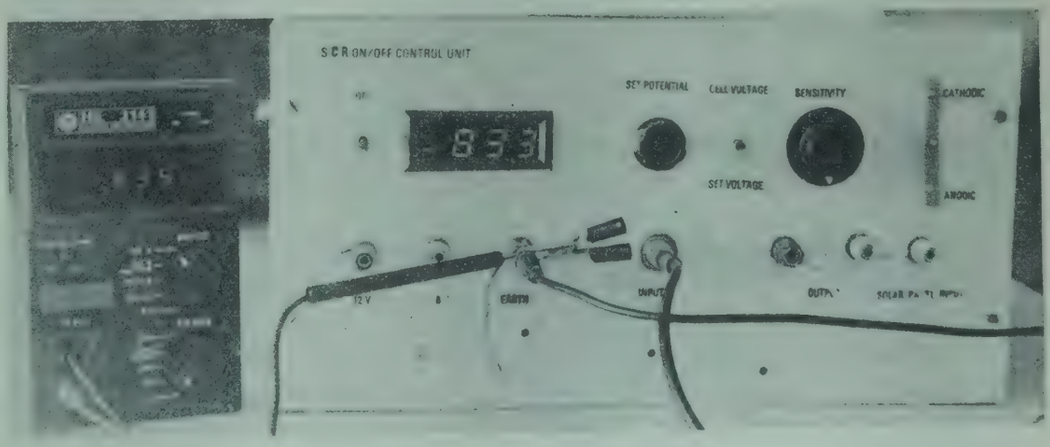
Improvements in or relating to automated SCR (silicon-controlled rectifier) control unit for use in cathodic as well as anodic protection installations

K.S. RAJAGOPALAN, H.N. VENKOBA RAO, S. GURUVIAH, N. KRITHIVASAN, S. BIRLASEKARAN, M.M. GURUMOORTHY, AND S.M. KRISHNAN
Central Electrochemical Research Institute
Karaikudi 623 006

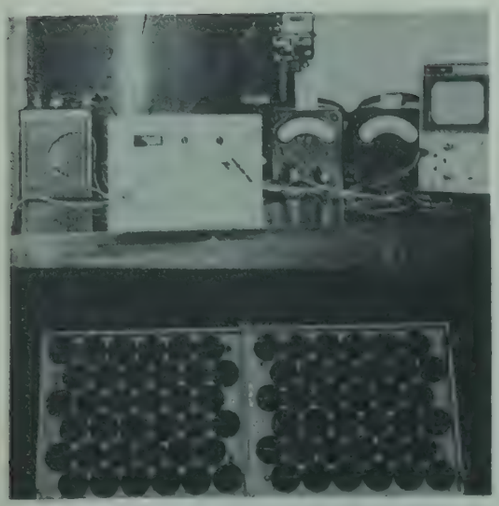
Developed for the first time in the country, the device can be used for field applications. It controls and monitors electrode potential with reference to a pre-set value within as close a tolerance limit as ± 3 mV, either for cathodic or anodic protection. Furthermore, it is adaptable for use of solar power or wind power to charge lead-acid batteries which can provide the impressed current.

The institute has used two solar photovoltaic modules of dimensions $535 \times 450 \times 90$ mm of 16.5 V and 0.94 A at P_{max} to charge a 12 V lead-acid battery of 60 Ahr capacity. Both cathodic and anodic protection have been established in laboratory trials extending over three months continuous durations on various systems. Industrial trials are under way. With 8 hr of sunlight utilized, an area of over 200 m^2 of painted steel can be protected.

Other advantages are: (1) easy reading of voltage with 3 1/2 digit LED/LCD digital facility; (2) the change-over from cathodic to anodic protection or vice versa can be effected simply with a band switch; (3) it provides a highly reliable



ON-OFF control unit of the silicon-controlled rectifier (SCR) for use in cathodic as well as anodic protection installations



Two solar photovoltaic modules for charging lead-acid batteries which provide the impressed current.

system for continuous working and can be employed for a wide range of current and voltage requirements; (4) the change-over from mains supply to dc supply is automatic when the mains fails; and (5) the system is amenable to monitor an unlimited number of electronic control units by employing microprocessors.

The essential components required for the fabrication of the unit are indigenously available, making it easy for manufacture or mass production for any rating of current and voltage. The cost of the unit for a 12 V/1A rating is estimated at Rs 1200. □

NBRI's training course on floral craft

A one-month training course covering the various aspects of floral craft based on the dehydration technique, which National Botanical Research Institute (NBRI), Lucknow, has developed, was held in March at this CSIR laboratory. Forming part of the scheme on floral craft for rural economy sponsored by Department of Science and Technology, the course dealt with the cultivation and dehydration of flowers and foliage so as to make them saleable items—artistic flower arrangements, wall-hangings and frames, paper-weights, table-tops, pendants, greeting cards, etc. □

CONFERENCE BRIEFS

Biotech. '83

Three CSIR scientists, namely Shri A.W. Khan of Central Drug Research Institute, Dr M. Singh of Indian Institute of Chemical Biology, and Dr V.C. Vora of Institute of Microbial Technology (IMT), participated in Biotech. '83—the first world conference on the commercial application of biotechnology, held in London, 4-6 May. Dr Vora, who is project officer of IMT, reports:

After a brief inauguration by Sir Hans Kornberg, the conference started in three simultaneous sessions. The discussions on developments in agriculture, biomass and environmental biotechnology, biocatalysts, health-care biotechnology, and fermentation indicated the areas of present global emphasis and the future trend of biotechnology.

In the area of environmental protection and utilization of residues and waste materials (domestic, agricultural and industrial), various fermentation processes including the current technology of biogas production were discussed. The recent advances in cellulose utilization technology and the cloning of the cellulase genes and their significance were presented by Prof. Eveleigh of Rutgers University, USA. It was apparent from these sessions that genetic engineering would have a major impact through the design of new strains of microorganisms which would lead to great advances in this area.

The role of immobilized enzymes and cells in health-care as well as chemical industry was discussed. Prof. Klibanov of MIT showed that unusual properties of some known and commercially available enzymes could be utilized in many biotechnological processes for producing rare chemicals and pharmaceuticals. The Research Association for Petroleum Alternatives Development, a Japanese consortium of 23 companies, presented a new method of continuous alcohol fermentation using an immobilized live yeast (*Saccharomyces*) cells system.

Many aspects of health-care biotechnology, including hybridoma, were discussed. Of these, the development and commercialization of a sensitive homogeneous phase, enzyme membrane immunoassay system was the highlight of this session. This method is based on the complement lysis of liposome which has been tagged with the antigens to be assayed. The method seems to be quite versatile, holding out applications to other areas of diagnostic biotechnology.

The application of genetic engineering in agriculture, the conferees observed, is a very promising area. With the powerful technique of plant tissue culture already available, another Green Revolution could be foreseen, since developments of new plants resistant to harsh conditions, such as high salinity, drought, and pests, are already on the way, observes Dr Vora. □

Shri R. Ganapati appointed Member (Finance), CSIR

Shri R. Ganapati, Secretary (Expenditure), Ministry of Finance, has been nominated member (finance), CSIR, in place of Shri Harbans Singh effective 31 May 1983. In his capacity as member (finance) of CSIR, Shri Ganapati will also be a member of the governing body and the Society (CSIR). □

COUNCIL OF SCIENTIFIC & INDUSTRIAL RESEARCH

Advertisment No. 14/83

The Council proposes to appoint at Indian Institute of Petroleum (IIP), Dehra Dun, a Scientist F in the areas of refinery technology and refinery process development.

Scale of pay: either Rs 2000-125/2-2500 or Rs 2250-125/2-2500-EB-125/2-2750. Further details about the post and prescribed pro forma for sending curriculum vitae obtainable from Joint Secretary (Administration), CSIR, Rafi Marg, New Delhi 110001. Deadline for receipt of applications at the above address: 17 *September* 1983. □

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CSIR scientists win two NRDC awards

Two teams of scientists from two CSIR laboratories are among the recipients of the National Research Development Corporation of India's Independence Day awards announced on the eve of this year's Independence Day.

One of the teams is Dr P.E. Sankaranarayanan, Shri P. Sudhakara Rao, and Shri R. Sridhar of Central Electronics Engineering Research Institute's extension centre at Madras. This team has been jointly awarded Rs 15,000 for developing a new electronic non-destructive vacuum-measuring instrument for canned food products. [*See CN*, 33(7), 52]

The other team comprises Shri A.V. Bhat, Shri A. George Varkey, Shri S.K. Kutty, Shri M. Gopalakrishnan, and Dr J.S. Pruthi of Regional Research Laboratory, Trivandrum. The award-winning work is a process for canning green pepper for which the five scientists share a cash prize of Rs 12,000. By this process freshly harvested tender green pepper of optimum maturity can be canned with no problems of sedimentation. A significance of the process is that the product is export-worthy.

In all, 10 teams of inventors have been awarded Rs 1,72,000 by NRDC. □

National Seminar on Slow Sand Filtration, Health Education and Information Support

That the technology of slow sand filtration (SSF) should be zealously promoted for wider all-India application during the International Water Supply and Sanitation Decade programme was the principal recommendation of the title seminar held at National Environmental Engineering Research Institute (NEERI), Nagpur, from 29 June to 1 July. The seminar also recommended that NEERI should be made the national focal point for exchange of technical information in order to effectively fulfil the goals of the decade. The national information network with NEERI as headquarters should work in close liaison with Central Public Health and Environmental Engineering Organisation (CPHEEO) of the Ministry of Works & Housing, and in collaboration with sub-centres which should be established in every state at public health engineering department level. Cooperation at the international level would include participation in POETRI (Programme on Exchange and Transfer of Information). The seminar also recommended that a working group be constituted with representatives of state public health engineering departments, information specialists, CPHEEO, and NEERI. This should be followed by conducting an information user survey to identify various categories of users and their information needs in the field of community water supply and sanitation for the Decade programme, and an inventory of information resources be compiled on a national level. The need to popularize the benefits of the SSF technology was emphasized. Other recommendations include the setting up of training centres for water treatment plant operators and incorporation of the technology of SSF in technical courses. The seminar also called upon non-governmental organizations to play an important role in the promotion of water supply and sanitation programme. The seminar observed that SSF plants not involving pre-treatment were cost-effective for a population of up to 1.15 lakhs.

The seminar was organized by NEERI in collaboration with the Commonwealth Science Council (CSC); the International Reference Centre (IRC), the Hague, assisted in the international research and demonstration project of SSF and in POETRI. Dr Van Damme, Manager of IRC, in his address at the inaugural session, observed that the decade (1981-90) programme was not a programme of pumps and pipes but of cooperation and participation of people. Acknowledging the participation of NEERI, Dr Damme said that IRC had found a valuable companion in NEERI.

Shri S.T. Khare, consultant to United Nations Development Programme, who inaugurated the seminar, hoped that adoption of low-cost technologies like SSF would enable India to meet the goals of the Decade. Commending the

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efforts of NEERI in promoting SSF as an appropriate and alternative technology, Shri Khare reiterated the need for a well-organized information system which could provide engineers in the public health field with the latest information from various sources in a simplified form.

Shri K.N. Johry, head of CSIR's International Scientific Collaboration Unit, and representative of CSC, outlined in his address the programmes of CSC in 30 countries of the Commonwealth.

The NEERI director, Dr B.B. Sundaresan, in his welcome address, urged the participants to focus attention on the adoption of SSF as an alternative technology and to help in developing an information linkage as part of the Decade programmes.

Shri M.K. Mukherjee, Secretary, Ministry of Works & Housing, spoke of the need to increase the coverage of the rural sanitation programme. He also urged that low-cost sanitation methods be adopted in urban areas with a view to meeting the goals of the Decade programmes. □

CONFERENCE OF PUBLIC HEALTH ENGINEERS

A two-day conference of chief engineers (public health) organized by National Environmental Engineering Research Institute (NEERI), Nagpur, in collaboration with the Union Ministry of Works & Housing, and held on 27-28 June 1983, endorsed the master plan document, drafted and compiled by the ministry, for achieving the targets set for the International Water Supply and Sanitation Decade (1981-90). The conference also endorsed the proposal for the setting up of a national-level financing institution for water supply and sanitation on the lines of Housing & Urban Development Corporation Ltd and Rural Electrification Corporation Ltd.

Some of the important recommendations of the conference:

The Seventh Plan outlay for water supply and sanitation should be at least 6% of the total in order to achieve the objectives of the Decade programme. An all-India service cadre of public health engineers should be created.

Norms should be laid down for operation and maintenance of water supply and sanitation projects on the lines of highway projects and these should be made obligatory for all sectors of society, including rural population, to pay for water supply services.

Shri M. Srinivasan, Joint Secretary, Union Ministry of Works & Housing, while inaugurating the seminar, informed the gathering that rural water supply programme had been given the highest priority in the Sixth Plan and formed part of the 20-Point Programme. As many as 2.31 lakh problem villages in the country would be covered; and during 1983-84 alone, about 48,000 of these villages would be provided drinking water. He thanked UNICEF for providing rigs and handpumps for the programme.

To implement the Decade programme the Government of India had constituted an apex committee. The national decade master plan document would spell out clear objectives and targets and serve as a valuable source of information regarding the current status of water supply and sanitation, planning methodologies, and goals, added Shri Srinivasan.

The NEERI director Dr B.B. Sundaresan underlined the need to adopt slow sand filtration (SSF) as the process was cost-effective and ideal for small communities. It was easier to maintain SSF plants than conventional water treatment plants, he said.

Dwelling on the manpower needs for implementing the Decade programme, the NEERI director stressed the need to update the curricula of B.E. (civil) courses so as to include the latest developments in public health and environmental engineering.

The conference was attended by about 100 participants who included, besides chief engineers (public health), representatives of central and state health education bureaus, NEERI scientists and overseas delegates from Sychelles, Bangladesh, and Sri Lanka. In addition, there were participants from Andhra Pradesh, Haryana, Maharashtra and Tamil Nadu who were collaborating with NEERI in the national programme on SSF. This CSIR laboratory had provided the know-how for setting up of four SSF plants, one each in the above-mentioned states. The SSF programme was launched by NEERI in 1976 in the country and had now reached the third and final phase.

An exhibition of posters, periodicals, and journals was also arranged under the Programme of Exchange and Transfer of Information (POETRI). Eleven booklets were released on the occasion. □

Get-together on corrosion problems in petroleum refineries

Corrosion problems facing petroleum refineries and solutions worked out by research laboratories were discussed at a get-together of research scientists of CSIR laboratories, Defence, Oil & Natural Gas Commission (ONGC), and Indian Oil Corporation Ltd (IOC) research centres with engineers of petroleum refineries and consultant engineering concerns like Engineers India Ltd. Held at Indian Institute of Petroleum, Dehra Dun, 25-26 July, the get-together was organized jointly by this CSIR laboratory and IOC. Some 40 delegates who presented 22 papers discussed corrosion due to cooling water used in various refining operations, the effect of the nature of crude handled on the corrosion of refining units, the effect of operating conditions and practices and nature of environment, and related problems. The contributions of National Metallurgical Laboratory, Jamshedpur, in the field of materials identification and development and their failure analysis; of Central Electrochemical Research Institute, Karaikudi, in corrosion

prevention; and of Regional Research Laboratory, Hyderabad, in the production of preventive coatings were presented. These contributions could save a considerable amount of foreign exchange, the get-together noted, considering that such inhibitors worth Rs 40 million were being imported. The potential of experience and expertise available with Defence Materials Store Research & Development Establishment, Kanpur, could also be made use of in solving the corrosion problems, the get-together observed. □

Commercial production of N-triacontanol started

Under a technical consultancy arrangement with Central Food Technological Research Institute (CFTRI), Mysore, Greenex Chemicals (P) Ltd have started manufacturing N-triacontanol at their recently set up factory at Siliguri. The product is marketed under the trade name Greenol. A naturally occurring plant growth regulator, N-triacontanol has been found to be very useful for increasing the yield of tea crop. This CSIR laboratory had developed a process for manufacture of the chemical from tea waste.

Foliar spraying of this chemical in milligram quantities per hectare increases the yield of tea leaves by 25-40%. The product has undergone extensive field trials conducted by United Planters Association of South India and in a number of tea estates in north-east India to prove its efficacy.

N-Triacontanol has also been found to be useful in increasing the yields of other field crops such as barley, corn, rice, wheat, maize, and tomato. CFTRI has plans to conduct extensive trials on various agricultural and plantation crops to understand the mode of action of the chemical. □

Cordierite-based saggars for pottery industry

To protect green ceramic wares from the ill-effects of direct firing in industrial kilns, saggars—containers used for firing ceramic wares—are essential. One of the major problems of the Indian pottery industry is the poor performance of the present-day saggars which are clay-based. Their average life is only 4 to 6 firing cycles, and as a result the cost of production of the ceramic wares goes up besides their quality being affected adversely.

To get round the problem of poor performance, Central Glass & Ceramic Research Institute (CGCRI), Calcutta, took up work at the request of All India Pottery Manufacturers' Association. The result is the development of cordierite-based saggars based on a suitable mixture of cordierite and clay. The saggar bodies developed, and prepared in bulk quantity, were evaluated under actual service conditions in a producer-gas-fired tunnel kiln and an oil-fired down-draught kiln of two well-known pottery units. In both the trials the saggars withstood more than 40 firing cycles.

The process has been referred to National Research Development Corporation of India for commercial utilization. Machinery and raw materials required for the production of cordierite saggars are available in the country.

A feature of the process is that if any pottery factory utilizes the process, only a small capital is required as most of the machinery needed will be available already in the factory itself. Even for a small-scale pottery unit the annual consumption of saggars of various sizes is estimated to exceed 50,000 pieces. Country-wide the present annual consumption may exceed 10 lakh pieces of saggars. □

Melting glass without a container: CSIR scientist takes part in NASA's space experiments

Dr Chandra Shekhar Ray, a researcher from Central Glass & Ceramic Research Institute, Calcutta, who is presently working as a postdoctoral fellow at University of Missouri-Rolla, USA, has taken part in a series of experiments on melting glass without the use of a container in the US space shuttle Challenger, launched on 18 June this year. The purpose of these experiments was to investigate the glass formation tendency, melt homogenization, melt mixing, etc. in microgravity and to determine if glasses melted in space have unusual properties. Containerless melting, an opportunity provided by microgravity, avoids melt contamination by a container (a deleterious effect which cannot be avoided on earth) and leads to ultrapure glasses. Heterogeneous nucleation/crystallization that occurs at the melt-container interface can be avoided in containerless processing, thus increasing the likelihood of glass formation for borderline glass formers. This is the first US shuttle experiment to deal with melting glasses and is a part of NASA's Materials Processing in Space (MPS) programme.

Dr Ray is directly associated with this fascinating research, directed by Prof. Delbert E. Day, Curators' Professor of Ceramic Engineering and Senior Research Investigator of the Graduate Center for Materials Research, University of Missouri-Rolla, Rolla, Missouri. The CGCRI scientist is primarily responsible, says Prof. Day, for all pre- and post-flight ground-based work such as the preparation of samples suitable for flight experiments and the evaluation of the properties of glasses produced in space for comparison with the properties of glasses of the same composition processed on earth under identical melting conditions. □

Improved technology for vetiver oil

The Central Institute of Medicinal and Aromatic Plants, Lucknow, has developed an improved technology for distillation of vetiver (*Vetiveria zizanioides*) roots, with which superior quality oil in better yields is obtained. The yield is 0.20-0.25% as compared with 0.06-0.10%, obtained with the existing technology. The process, developed on a 25 kg per batch scale,

would pave the way for commercial plants. The oil is a foreign exchange earner. □

Electric analog model study of groundwater basins in India

Appropriate techniques for simulation of different geohydrological situations, particularly those involving complex boundary conditions and a few special features encountered in aquifer modelling, have been studied by Shri M. Thangarajan of National Geophysical Research Institute, Hyderabad. The study encompassed the principles of resistor-capacitor (RC) analog modelling, R-C analog instrumentation, techniques for simulation of time-variant stresses, ephemeral streams, and interaction of river aquifer systems. Two groundwater basins, one in hard rock and another in alluvium, were studied.

Any quantitative study in hard rock areas is beset with several difficulties. Particularly, the estimation of hydrogeological parameters and their interpolation to evolve a regional picture is often not possible. An R-C analog model of hard rock aquifers has not been tried earlier.

An attempt has been made by the researcher to model an aquifer in the granitic terrain area of Tallaguda-Palmokul basin, Andhra Pradesh. The groundwater in this region occurs in the weathered granitic gneiss and the underlying sheet fractures. The aquifer model was constructed and verified against the historical water levels observed during the period 1973-78. Sensitivity analysis was carried out by changing the specific yield and transmissivity. Four prediction schemes were studied and their results analyzed.

The researcher also studied the Krishni-Hindon interstream region in Uttar Pradesh. A single-layer R-C network was fabricated to simulate the Krishni-Hindon interstream aquifer which has semi-confined conditions at some places but has hydraulic connection with a phreatic aquifer on a regional scale.

The groundwater withdrawal in this area was feared to exceed the normal recharge. The input/output quantities in the model were simulated by using suitably programmed current/voltage generators and current sinks. The model study based on the available data shows that the aquifer can sustain the present output rate of 200 million cubic meters per year without much damage to groundwater regime. The findings are expected to help evolve and select an optimal groundwater exploitation and management policy.

Shri Thangarajan, who worked under the supervision of Dr C.P. Gupta of NGRI and Prof. R.K. Verma of Indian School of Mines, Dhanbad, was awarded the Ph.D. by ISM (1983). □

Release and metabolism of the neurotransmitter amino acid glycine

The three main symptoms of Parkinson's disease, namely hypokinesis or akinesia, tremor, and rigidity, can be reproduced experimentally in homoeothermic animals by the use of suitable pharmacologically active compounds. The specific muscarinic cholinergic agonist oxotremorine (OT) [1-(2-oxo-1-pyrrolidinyl)-4-(1-pyrrolidinyl)-2-butyne], which is active both centrally and peripherally, is one such powerful compound producing the characteristic features of Parkinsonism in experimental animals like the rat or cat. *In vivo* studies with OT have been carried out by a researcher, Shri P. Dasgupta, of Indian Institute of Chemical Biology, Calcutta, with a view to elucidating the neurochemical mechanism(s) involved in the impairment of normal motor activities caused by this compound. This was expected to help understand the neurochemical lesion in Parkinson's disease and design a more effective therapy of the disease.

The involvement of the central structures in OT action is well documented. The neutral amino acid glycine has been shown to be the natural inhibitory neurotransmitter at strychnine-sensitive synapses in the brain stem and spinal cord regions of the vertebrate central nervous system (CNS). In the present work it has been shown in experimental rats that (i) OT enhances glycinergic neurotransmission in the spinal cord synapses in consequence of its muscarinic action in the CNS; (ii) dopaminergic modulation may not be involved in the OT-induced glycine release in the spinal cord, and (iii) the increased release of glycine on to the motoneurones may be the causative factor in producing akinesia, which is one of the cardinal symptoms in OT-induced experimental Parkinsonism in animals. The role of glycine as an inhibitory neurotransmitter in the vertebrate retina has been suggested by various neurochemical, electrophysiological, neuropharmacological, and autoradiographic studies. The present studies on the metabolism of glycine in the vertebrate retina *in vitro* indicated that (i) glycine may be synthesized in the retina by glyoxylate aminotransferase (EC 2.6.1) action from amino acids such as L-glutamate, L-alanine, and L-glutamine; (ii) both D-glycerate dehydrogenase (EC 1.1.1.29) and 3-phospho-D-glycerate dehydrogenase (EC 1.1.1.95) activities are present in the retina. However, only D-glycerate dehydrogenase activity exhibited a significant correlation ($r = 0.998$, $p < 0.01$) with the glycine content in various CNS regions, including the retina; (iii) serine hydroxymethyltransferase activity was present in the retina. The activity of this enzyme also showed a significant correlation ($r = 0.995$, $p < 0.001$) with glycine concentrations in different regions of the CNS, including the retina. It is therefore likely that glycine is synthesized from serine in the retina following the nonphosphorylated pathway as follows: D-glucose → steps → D-glycerate → steps → L-serine → glycine.

Shri Dasgupta, who worked under the guidance of Dr A. Narayanaswami (formerly of IICB), was awarded the Ph.D. degree (biochemistry) by Calcutta University (1983) for his thesis. □

PROGRESS REPORTS

NGRI Annual Report: 1981-82

The annual report of National Geophysical Research Institute (NGRI), Hyderabad, for 1981-82, published recently shows that the laboratory's activities were carried out under 31 planned research projects in seven areas: exploration; instrumentatior; engineering geophysics and geology; magnetism and aerogeophysics; deep seismic sounding and seismicity, theoretical geophysics, seismic surveillance and earthquake prediction and related studies.

A research project entitled 'Methods and techniques for mineral exploration' sponsored by UNDP in 1976 was successfully completed. A microprocessor-based sophisticated pulsed transient EM field unit was developed and field-tested. Software for more efficient processing of field data is a significant spinoff from the project. Negotiations are under way for their wider utilization in India and other countries.

Another project on 'Integrated exploration methods for minerals' was started with UNDP assistance.

A high-resolution reflection seismic survey was carried out on an experimental basis at Monidih area near Dhanbad (Bihar) to obtain precise data on structural disturbances in the area needed for improving coal mining. The coal seams in this part of the Jharia coalfield were found to be deeper than those at Bhowra and Kothagudem, where previous surveys had been conducted.

A favourable sub-surface zone for gold exploration has been inferred in Champion lode system of the Kolar Gold Fields from the operations research studies undertaken at the request of Bharat Gold Mines Ltd. A detailed analysis was made of an area lying between coordinates 15800 S to 19800 S (i.e. from PROBYN's shaft to Air Shaft) and levels 2 to 23 of the Champion lode system of KGF.

Investigations on the project sponsored by Bharat Aluminium Co. Ltd/ National Aluminium Co. Ltd on 'Propagation velocity in rocks of Panchpatmali region by laboratory and field geophysical methods' showed that the bauxite rocks of this region may be classified as rippable to marginally rippable, whereas the laterite bodies appear to be marginally rippable to non-rippable and, therefore, both shattering and ripping may become necessary for the exploitation of the ore body.

Sponsored geophysical surveys for groundwater were carried out for eight parties. A total of 60 sites was recommended for sinking wells. Geohydrological studies were carried out in the Deccan Trap area (Godavari-Purna and Kukadi basins) and granitic area (Chitravathi basin). Five out of eight recommended sites in Godavari-Purna basin yielded, on drilling, 5000 to 13,000 litres of water per hour. The aquifer modelling studies of the deeper aquifer in Ghazipur district, Uttar Pradesh, and Dudhi-Shakkar interstream region, Madhya Pradesh, were continued.

A sensitive magnetic field pickup and recording device for application in magnetotelluric exploration was developed. Electrical extensometers, stress meters and load cells, which are completely moisture- and dust-proof, were developed. These instruments find application in mining engineering. An apparatus for the measurement of porosity of rocks and other solids was released for commercial production to a local firm through NRDC.

Aeromagnetic surveys in part of Cuddapah basin and the adjoining crystallines were made, covering 23,000 line-km under an ongoing collaborative project with Geological Survey of India (GSI). The aeromagnetic map of part of Cuddapah basin (about 7000 km^2 of area) adjacent and to the west of the earlier Operation Hard Rock' area was provided to GSI. This study would throw light on the structure tectonics, basin evolution, and mineralization in the region.

Under the CRUMANSONATA programme sponsored by GSI, field work was completed for deep seismic sounding along (i) Khajuriakalan-Chipanar-Rahatgaon, (ii) Pahrihat-Chicholi-Masod, and (iii) Multai-Warud-Pulgaon in the Narmada-Sone lineament.

In-situ stress measurements in the underground mines of KGF were successfully carried out by using the hydraulic fracturing technique, in collaboration with FRG. The stress measurement carried out at a depth of about 10,000 feet at KGF is a world record.

This CSIR laboratory, in collaboration with another CSIR constituent, RRL, Jorhat, has established seismic stations at Jorhat, Yaongyimsen, Kohima, and Itanagar. Thus with the operation of the seismic stations, the detection and location capabilities of seismic events have been improved in the North-East region.

During the year under review, 62 research papers were published and 9 technical reports were released. □

Indian parliament and S&T policy

A study carried out by National Institute of Science, Technology and Development Studies (NISTADS), New Delhi, has pointed up the need for developing an information base attached to the Indian parliament to facilitate objective evaluation of national S&T programmes. The report observes that increasing interaction among the people, the politicians, and the scientific community would go a long way in establishing an effective national S&T policy system. The results of the study, made by A. Rahman and Nirmal Haritash of NISTADS, have been brought out as a report titled 'The Role of Parliament in the Formulation of National Science and Technology Policy'.

The report (108 pages; 152 references) is divided into seven chapters and a three-page summary including recom-

mendations for strengthening the parliament—science & technology link. In Chapter I are presented the background to the study, the objectives, starting hypotheses, and the methodology. A review of literature on the interaction of parliament and S&T institutions forms the subject of the second chapter. Apart from a historical perspective in the Indian context, this chapter includes as an appendix in which is reproduced the Scientific Policy Resolution of 1958. Links existing between the political and S&T systems are the subject matter of the next chapter. These include formal and legal links in the form of various parliamentary committees like the Public Accounts Committee and Estimates Committee, and deliberative and informal links like the National Committee on Science and Technology (now Science Advisory Committee to the Cabinet) and through participation of scientists in political parties or parliamentarians in seminars on scientific topics. A study of the role of political parties in the formulation of S&T policies from the pre-independence era to the present time is presented in Chapter IV. The role of the Prime Minister in formulating S&T policies is of paramount importance in the Indian context. This is borne out in Chapter V. An empirical study of the 'question hour' in the parliament and an analyses of the professional backgrounds of parliamentarians asking questions on S&T matters are the subject of the next chapter. The study reveals that the percentage of questions on S&T matters is disappointingly low: 3.7% in 1951, 5.3% in 1961, 3.6% in 1971, and 4.9% in 1978. The last chapter is devoted to the functioning of parliamentary finance committees. A content analysis of the reports of these committees pertaining to S&T institutions is also presented.

Copies of the report (unpriced) obtainable from: The Director, NISTADS, Hillside Road, New Delhi 110012. □

CONFERENCE BRIEFS

ISO meeting on spices and condiments

Dr A.G. Mathew, Acting Director of Regional Research Laboratory, Trivandrum, attended the International Standards Organisation's meeting on spices and condiments held in Balatonfured, Hungary, from 6 to 10 June. Dr Mathew, who was elected chairman of the meeting, reports:

The various standards taken up in the meeting related to celery, pepper, caraway, curry powder, cardamom, wild majoram, and fennel. India has particular interest in pepper and cardamom. It would appear that we have superior quality control and that Indian standards also are more stringent than those of other developing countries. The meeting decided that India would take the lead in revising the standard for cardamom.

On the standardization of the method for volatile oil, some modifications were done to the original draft. The method for the determination of capasaicin was also reviewed. As sophisticated instrumentation is not available in many developing countries, the meeting agreed to consider adopting one of the methods suggested by India along with the one based on gas chromatography or HPLC.

It was also decided to formulate standards for the oleoresin in consultation with the relevant group on essential oils. As India has a good specification, it was agreed that its document would be the starting point.

Dr Mathew, along with the members of the committee, made a visit to Compack in Budapest, where various spices, coffee, tea, etc. are packed. The flavour aspects are accorded the greatest importance, and sophisticated packaging techniques are also adopted, observes the CSIR delegate to the ISO meeting. □

DEPUTATION BRIEFS

Shri B.R. Juneja of National Botanical Research Institute, Lucknow, deputed to USA, from 28 April to 2 June, under the CSIR-NSF Bilateral Exchange of Scientists Programme, studied the latest trends and techniques in the fields of documentation, reprography, computerized databases, particularly in the field of economic botany, organization of information services, and science publications in that country. The NBRI scientist also attended the Global Conference of the International Federation of Scientific Editors, Society for Scholarly Publishing and the Council of Biology Editors, held at Philadelphia, during 15-20 May. He also delivered lectures on NBRI and its activities at some of the organizations he visited. □

PATENTS INFORMATION

Indian Pat. 65/Del/83 (Filed)

Tribotester

S.K. BASU AND H. BAGCHI
MERADO
Pune 411 008

The patent covers a versatile equipment for carrying out different tests in tribology. Designed and developed by Mechanical Engineering Research and Development Organisation (MERADO), Pune, and designated as Tribotester, the device measures wear on the principle of 'pin on roller' and the coefficient of friction on 'pin on disc'. A motor (0.75 hp, 930 rpm) drives the steel roller through a pulley-gear train system and specimen-holder by lead screw-nut mechanism. The reciprocation of the specimen is done by two limit switches. The specimen is loaded by means of a specially designed holder. Drive of the C.I. disc is taken from the rotating roller. The specimen is directly loaded by dead weights here and the frictional force is measured by a precalibrated proving ring. The wear and friction experiments can be done either separately or simultaneously. It takes a short time to measure wear by this method. □

CRRI's new library building opened

The new library building of Central Road Research Institute (CRRI), New

Delhi, was opened on 11 May by Prof. S. Nurul Hasan, CSIR's Vice President. Present on the occasion was Dr G.S. Sidhu, Director General of CSIR. Going round the library, Prof. Nurul Hasan emphasized the need for computerized information storage and library services and access to international databases relevant to the field of highway engineering. □

PERSONNEL NEWS

DR N. RAMANATHAN APPOINTED CLRI DIRECTOR

Dr N. Ramanathan, Acting Director, has been appointed Director, Central Leather Research Institute (CLRI), Madras (28 July 1983).

Dr Ramanathan, who has been with CLRI since 1957, has had a brilliant academic career, obtaining his M.Sc. and Ph.D. degrees from University of Bombay, and another Ph.D. from Leeds University, UK.

Dr Ramanathan's contributions relating to collagen, leather fibres, leather, and footwear are well recognized. His discovery of the directional friction effect in collagen fibres, which has been quite useful in developing processes to overcome defects in hides, has led to the adoption of better tanning methods and techniques. A shoe sizing system based on the various feet parameters, a technique to measure the distribution of a person's weight on the various segments of feet, and an electrical microbalance, are some of the other contributions standing to his credit.

A fellow of Indian National Science Academy and a founder-fellow of Tamil Nadu Academy of Sciences, he has to his credit more than 200 research papers.

Dr Ramanathan has also worked in the National Research Council of Canada, Ottawa, for a year and visited a number of research laboratories and industrial establishments in USA, Canada, UK, France, Germany, Sweden, Japan, Thailand, and Singapore; he was also leader of several study teams under the auspices of FAO and UNIDO. □

PROF. SHAMSHER PRAKASH APPOINTED CBRI DIRECTOR

Prof. Shamsher Prakash, head of the Civil Engineering Department of University of Roorkee (UoR), Roorkee, has been appointed Director of Central Building Research Institute (CBRI), Roorkee (1 Aug. 1983).

Born 3 January 1933, Dr Prakash took his B.E. (1954) and postgraduate diploma in civil engineering (1959) from UoR and M.S. (1961) and Ph.D. (1962) degrees from University of Illinois, Urbana, USA.

Starting his professional career in the Irrigation Department of Punjab, Dr Prakash joined as lecturer in the Civil Engineering Department at UoR in 1957. In 1966 he was appointed Professor in soil dynamics and, in 1970, Professor in civil engineering. During 1978-81 he was Professor in civil engineering in University of Missouri-Rolla (USA). Returning, in 1981, to UoR as Professor and head of the Civil Engineering Department, he guided 12 candidates for their Ph.D. degrees and 27 for M.E. degrees. His research interests include mass housing, indigenous materials, standardization, soil dynamics, piles and machine foundations, liquefaction of soils, and geotechnical engineering.

With significant contributions in soil engineering, Prof. Prakash has been consultant to several governmental and non-governmental agencies in India. He has directed the setting up of the Geotechnical Earthquake Engineering Laboratory, as also the National Science Foundation's project on slip table for liquefaction studies at the University of Missouri-Rolla.

Prof. Prakash is currently chairman of the International Conference on Case Histories in Geotechnical Engineering, St Louis-1984, and of the International Workshop on Soil Structure Interaction, UoR-1983. He has chaired a number of conferences on geotechnical enginering. He was leader of the Indian delegation to the International Conference on Soil Mechanics and Foundation Engineering held in Moscow (1973) and Tokyo (1977). He was also chairman of an (erstwhile) NCST committee to draft recommendations on foundation design and construction.

A fellow of Institution of Engineers (India), American Society of Civil Engineers, and Institute of Civil Engineers, London, Prof. Prakash is recipient of the Union Ministry of Irrigation's prize (1980), Khosla Research Gold Medal and cash prize (1978), NRDC cash prize for oscillatory, shear box (1972). Besides, he was awarded Khosla Research Medals and cash prizes by UoR in 1965, 1967 and 1974. Author or co-author of six books, he has also to his credit 170 research papers and 83 technical reports. □

PROF. C.G. SWAMINATHAN RETIRES

Prof. C.G. Swaminathan, Director, Central Road Research Institute (CRRI), New Delhi, laid down office on 21 July on voluntary retirement. He was with this institute for nearly three decades, except for about two years during 1960-62 when he had moved over to Indian Institute of Technology,

Madras, as Professor in charge of the Civil Engineering Department.

Joining CRRI in 1953 as head of its Flexible Pavements Sub-discipline, Prof. Swaminathan was promoted as Scientist F in 1968 and took over as Director in 1977.

Among the projects completed under his direction at CRRI are the rural roads project, road user cost study, traffic simulation studies, and the traffic and transportation studies of the Bombay metropolitan region.

Widely travelled all over the world to attend meetings and conferences, he recently participated, on invitation from ESCAP, in the workshop on 'Non-motorized Transport' where he was elected chairman of the session. At the invitation of the World Bank, he delivered lectures in Arizona, USA, in July this year on 'road user cost study', a project undertaken by CRRI.

A fellow of several professional societies, Prof. Swaminathan is the author of about 100 technical reports and 50 research papers, and of a number of patents. □

Appointments Promotions

DR P.V. SANE

Dr P.V. Sane has been appointed Scientist F at National Botanical Research Institute (NBRI), Lucknow (4 June 1983). Dr Sane was earlier heading the Agricultural Biochemistry Section of the Biology and Agriculture Division of Bhabha Atomic Research Centre (BARC), Bombay.

Dr Sane (born 24 Dec. 1937) has had a brilliant academic career throughout, obtaining a gold medal in his M.Sc. (Ag.) from Nagpur University in 1960. Having been with Indian Standards Institution, New Delhi, for four years he proceeded to Canada where he taught at University of Alberta, Edmonton, and also obtained Ph.D. degree in 1968 from that university. Later, he was Assistant Research Botanist at the Department of Botany, University of California, Berkeley, for four years and was a guest scientist at Institut fur Biochemie der Pflanzen, Ruhr Universitat, Bochum, for a short while, before returning to India to join BARC. He held a senior fellowship of the Alexander von Humbolt Foundation during 1979-80.

Dr Sane's main research interest has been in the field of biochemistry of photosynthesis. He has published more than 70 research papers and several review articles and has contributed chapters in several books. His review on Distribution of function and structure of chloroplast lamellae' is a citation classic.

Recipient of Shanti Swarup Bhatnagar Prize in biological sciences for 1981, Dr Sane is a fellow of Maharashtra Academy of Sciences, associate editor of *Journal of Plant Physiology and Biochemistry*, member of editorial board of *Journal of Scientific & Industrial Research*, and a member of several national expert committees. □

* * *

At Regional Research Laboratory, Jammu, Shri Ajit Singh has been promoted, consequent on assessment, as Scientist EI (1 Jan. 1982) and Shri R.K. Razdan as Scientist B (19 Feb. 1983).

Transfers

Shri J.C. Choudhury, Scientist B, Regional Research Laboratory, Bhubaneswar, has joined Insdoc's Calcutta centre, as Documentation Officer B (24 June 1983).

ANNOUNCEMENTS

International Conference on Insect Reproduction

An international conference on Natural Products as Regulators of Insect Reproduction' is being organized by Regional Research Laboratory, Jammu, from 29 September to 10 October 1983 as part of its silver jubilee celebrations.

The technical sessions will relate to: Physiology and reproduction; Social and environmental influences in reproduction; and Artificial modification of reproductive physiology by natural products.

Participation in the conference is by invitation. Further details obtainable from the conference coordinator: Dr T.N. Kaul, Head, Regional Research Laboratory (Branch), Sant Nagar, Srinagar 190005.

* * *

National Conference on Water Desalination

A National Conference on Water Desalination, the third in the series, jointly sponsored by Central Salt & Marine Chemicals Research Institute (CSMCRI), Bhavnagar, and the Government of Gujarat will be held at this CSIR laboratory during 10-12 February 1984 (dates tentative). The conference will cover solar distillation and other distillation techniques; reverse osmosis; ultrafiltration; ion exchange and electrodialysis for water desalination; and other industrial applications. Abstracts of the papers to be presented and the registration fee (Rs 100 per delegate) will be accepted up to 15 October 1983.

Further information obtainable from Dr A.V. Rao, Organizing Secretary, Third National Conference on Water Desalination, CSMCRI, Bhavnagar 364002. □

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Improved bullock-carts

Field trials on the prototypes of bullock-carts with improved designs which had been fabricated and distributed to farmers in areas around Delhi in June 1981 have enabled Central Road Research Institute (CRRI), New Delhi, to effect further improvements.

On the basis of feedback data combined with further laboratory tests, improved cart designs with many innovative features have been evolved by this CSIR laboratory. The improvements in the design include the provision of an improved housing unit for bearings for wheels, adjustable drawbar, convertible platform, braking system, etc.

The technology for the improved bullock-cart is available to manufacturing parties on a nominal payment of Rs 500 [See also *CN*, **31** (1981), 84]. □

Potassium chlorate plant goes into production

Based on the technology developed at Central Electrochemical Research Institute (CECRI), Karaikudi, a firm, Shantha Chemicals Ltd, has started commercial production of potassium chlorate at Pondicherry. After the firm obtained licence from National Research Development Corporation of India, the CSIR laboratory demonstrated to the technical representatives of the firm the method of preparation of graphite substrate lead dioxide electrodes and the production of potassium chlorate, employing graphite substrate lead dioxide electrodes. The institute also rendered consultancy services to the firm in the erection and commissioning of the plant, and deputed one of their scientists to the factory site to help the firm put up the plant. The firm is now running twelve 4,000-A chlorate cells, employing graphite substrate lead dioxide electrodes.

By using graphite substrate lead dioxide electrodes it is possible to bring down the graphite consumption and also eliminate the filtration step which is necessary when graphite is used. The installed capacity of the plant is 400 tonnes per year. □

Improved bullock-cart designed and developed by CRRI. The improvements relate to the housing unit for bearings, drawbars, loading platform, wheels, and braking system.

Microporous chromium

The usefulness of microdiscontinuous chromium as a top coat for bright nickel-plated surfaces is assuming importance in the field of electroplating. The micro discontinuities in chromium expose a large area of nickel under-

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neath, bringing down the corrosion current density of the system. Improvement in corrosion resistance can be further increased by making use of double-layer nickel as the undercoat for chromium.

The Central Electrochemical Research Institute, Karaikudi, has developed a bath composition which can be used for directly applying microporous chromium on bright nickel surfaces. The bath is based on chromium trioxide with certain minor constituents. The bath is operated under the usual conditions of current density and temperature. The extent of micro porosity, assessed by depositing copper on the exposed nickel, was found to be of the order of 20,000 to 40,000 pores per sq.cm. □

Tiny cement plants on turnkey basis ready for release

The Regional Research Laboratory (RRL), Jorhat, has developed designs of vertical shaft kiln for producing portland cement on scales of 10, 15 and 20 tonnes per day capacity and with specifications conforming to IS:269-1976. To make the process on a turnkey basis available for commercial utilization, a tripartite agreement has been reached between National Research Development Corporation of India, RRL-Jorhat, and Ganesh Industrial Service Agency (GISA), Gandhidham. GISA will offer consultancy to prospective entrepreneurs on a turnkey basis for setting up tiny cement plants of the three capacities, based on this CSIR laboratory's technology.

RRL-Jorhat will render service for testing of raw material samples from prospective clients to ensure suitability for the manufacture of cement and advise the client on any modification relating to a particular plant.

GISA will offer complete design package for a standard plant of 10, 15 and 20 tonnes per day capacity. The agency will also extend guarantee to the client on technical adequacy of the engineering design, performance of integrated process, and quality of the product as set out in the IS specification.

In a separate agreement, Laxmi Engineering Works, Udaipur, have been authorized to fabricate tiny cement plants of vertical shaft kiln design of the three capacities to prospective entrepreneurs. □

CFTRI assistance for agro-industries complex

The Central Food Technological Research Institute (CFTRI), Mysore, has rendered assistance to the Department of Horticulture of Karnataka government in establishing an agro-industrial complex around Bangalore, and a versatile cold store at Dharwar.

An essential feature of the proposed complex is the integration of production, processing and marketing, primarily with a view to propagating good varieties of tomatoes suitable for processing. Mangoes, pineapples, oranges, and grapes are also proposed to be processed for production of canned mango pulp, canned pineapple slices, pineapple titbits, pineapple juice concentrate, orange juice concentrate, and grape juice concentrate.

This CSIR laboratory has evaluated some varieties of Bulgarian tomato for their suitability for producing, for example, pastes, juice and ketchup on an industrial scale and provided a comprehensive report containing recommendations. The project is estimated to cost about Rs 15 million with an employment potential for about 200 people.

The Directorate of Horticulture has entered into an agreement with CFTRI for obtaining technical know-how and assistance in establishing the cold storage plant at Dharwar. The unit would store a variety of horticultural produce like potato, onion, garlic, green pea, green chilli, tomato, green bean, lime, lemon, orange, cabbage, cauliflower, and carrot. □

Diffusion phenomenon in polymer composites

The strength of polymer composites degrades because of the presence in them of moisture. The problem is more acute with composites made from natural fibres like jute, which are otherwise inexpensive and abundant in India. The need for a thorough understanding of the moisture absorption phenomenon in such materials prompted a researcher, R.M.V.G.K. Rao, of the Materials Science Division of National Aeronautical Laboratory (NAL), Bangalore, to investigate the diffusion phenomenon in polymer composites containing permeable (jute) as well as impermeable (glass/graphite) fibres.

The researcher has shown that a Fickian diffusion model is applicable to jute-epoxy composites. He has further studied the absorption behaviours of both classes — permeable as well as impermeable—of composites under the influence of varied internal (fibre fraction and orientation) and external (relative humidity and temperature) conditions. A conclusion of the study is that both the composites exhibit similar trends under the influence of the latter condition, while they show totally opposite trends under the former condition.

The NAL scientist has derived theoretical expressions for moisture absorption in jute-epoxy composites by introducing a novel volume fraction term, viz. the volume fraction of a resin impregnated jute fibre in a resin matrix. The practical data are in accord with the theory.

The researcher has also suggested technoeconomically viable methods of reducing the moisture absorption levels in jute composites by simple fibre-modification procedures.

Shri Rao was awarded Ph.D. degree (1983) by Indian Institute of Science, Bangalore, for his thesis based on the study.

28 countries out of which 4 were from India. In 25 sessions the conference reviewed innovations and progress made in various areas: Non-destructive testing, medical ultrasonics, acoustic emission, visualization, material characterization opto-acoustics, physics of ultrasound, high-power ultrasonics, underwater ultrasonics, acoustic microscopy, transducers, and instrumentation.

The NPL scientist presented two papers. In his first paper entitled 'A selective audio signalling system' (co-authors: V.N. Bindal and T.K. Saksena), he reported a novel concept and development of a practical audio signalling system in which a difference frequency tone of 4.1 kHz is produced by parametric interaction of two intense ultrasonic beams in air from two transducers resonating at 23.2 kHz and 29.1 kHz with a sound pressure level of 143 dB and 131 dB at one foot (ref.: 2×10^{-4} μbar) respectively. The generated beam is fairly directional with no side lobes. The system is capable of sending the desired information in a given direction. The signal is audible to unaided ears at distances over 200 m in a narrow zone. The paper predicted future applications in selective communication and acoustic sounding.

In the second paper entitled 'A diaphragm-type strain gauge power meter' [by V.N. Bindal, V.R. Singh, and (Smt) R. Gupta], Shri Chandra reported the development of a simple and portable ultrasonic power meter in which a semiconductor-type strain gauge is employed. Radiation pressure on the specially designed conical diaphragm, which forms a part of the top surface of an enclosed chamber, is balanced by the extra pressure pumped into the chamber and monitored by the semiconductor strain gauge mounted on a spring under the diaphragm. The present method has all the inherent advantages of a null method and is suitable for measurement of acoustic power in the wide range of milliwatts to several watts.

The concluding, panel session discussed the future trends in ultrasonics.

A feature of the conference was an exhibition of ultrasonic instruments, devices and materials. □

Indo-Soviet Cooperation in building materials

Participating in the fourth meeting of the Indo-Soviet Cooperation's working group on building materials held in Moscow, 25-26 July, Shri R.C. Mangal, of Central Building Research Institute, Roorkee, reports:

The meeting reviewed the progress made in this field during the last few years and also identified new areas of mutual interest to both the countries in the field of building materials and construction. The working group consisted of representatives from Cement Research Institute of India (CRI), Indian Standards Institution, CBRI, and the cement industry (private sector), under the leadership of Dr H.C. Visvesvaraya, Director General of CRI. The working group visited a number of institutes and other organizations.

The CSIR scientist's main interest was in the Institute of Silicatobaton at Tallin, the only institute working on building materials other than cement in USSR. CBRI has successfully completed a project in collaboration with this institute on the production of sand-lime bricks, the technology for which has since been assigned to National Research Development Corporation of India. It is now proposed to extend this cooperation for production of other precast building materials by using lime, sand, fly ash, cement, etc. This item, included in the current protocol for exchange of information only, could be extended later for wider collaboration, if required. Information on a few other items concerning prefabricated housing construction and use of agro-industrial wastes for the manufacture of building materials will also be exchanged. It is hoped that in future this mutual collaboration would prove very useful for the production of new building materials from wastes, and for prefabrication in building construction to save on cost, time, and consumption of materials. □

Two CSIR scientists in Indian scientific delegation to USSR

Dr Asghar Husain of Regional Research Laboratory, Hyderabad, and Dr R.A. Mashelkar of National Chemical Laboratory, Pune, were among the four-member Indian delegation which visited USSR from 28 June to 13 July last. The purpose of the delegation, led by Dr Asghar Husain, was to acquaint themselves with, and to identify, broad areas for collaborative research in heat and mass transfer and to exchange views with the Soviet scientists. Dr M.S. Mukund of Indian Institute of Science, Bangalore, and Dr G.K. Sharma of Indian Institute of Technology, Bombay, were the other two members. Dr Husain's report:

Organized by the Department of Science and Technology and CSIR, under the Scientific-Technical Cooperation, the delegation visited Luikov Heat and Mass Transfer Institute, Minsk; Institute of High Temperature, Moscow; and Institute of Thermophysics, Novosibirsk.

The delegation signed a protocol with the Luikov institute, identifying the areas of possible collaborative research. The protocol also identified certain CSIR laboratories, IITs, IISc and other institutions in India which could collaborate in specific areas.

The delegation observes that (i) there is total openness among Russian scientists; (ii) clear linkages exist between industry and the research institutes; (iii) Soviet scientists are held in very high esteem both by the society and the state; and (iv) specialized groups are encouraged to write books, etc. □

PATENTS INFORMATION

Indian Pat. 140/Del/83 (filed)

Process for preparation of car-4-ene-3-ol

R.B. MITRA, ZAINAB MULJIANI, AND A.R.A.S. DESHMUKH

National Chemical Laboratory, Pune 411 008

The invention covered by the patent relates to a new, improved method for

substrate specificity as that from other sources. It has been shown during this study that the capability of dark repair of DNA decreased concomitantly with toxinogenecity and a plausible correlation between toxinogenecity and some metabolic functions has been predicted.

A radiation-sensitive mutant of the hypertoxinogenic strain 569B of *V. cholerae* was isolated. The mutant-designated *V. cholerae* 569B$_s$ lacks both excision and medium-dependent dark repair mechanisms of UV-induced DNA damage while retaining the wild-type photoreactivating capability. Analysis of irradiated cell DNA by velocity sedimentation in alkaline sucrose gradients has shown that the dimers are not incized in this mutant. In contrast to the wild-type cells, the mutant cell DNA was degraded after treatment with nalidixic acid. The mutant cells failed to produce any detectable amount of cholera toxin as determined by ileal loop assay.

DNA repair-proficient and -deficient cells were used to examine host cell reactivation (HCR), Weigle reactivation (WR), and photoreactivation of UV-irradiated cholera bacteriophages. DNA damage in phages of different morphological and serological groups could be efficiently photoreactivated. HCR of irradiated phages of different groups was different on the same indicator host. Attempts to demonstrate WR or UV-irradiated choleraphages were not successful, although UV-induced filamentation of host cells was observed.

Shri Das, who worked under the guidance of Dr J. Das of IICB, was awarded Ph.D. degree in physics (1983) by Calcutta University for his thesis based on the study. □

PROGRESS REPORTS

IICB Annual Report: 1981-82

The annual report of Indian Institute of Chemical Biology (IICB)—formerly known as Indian Institute of Experimental Biology, Calcutta, for 1981-82 shows that the institute had on hand 55 R&D projects. The highest number of projects (17) was in the field of emerging areas in biological research, 16 projects were in experimental medicine, and 10 each were in (i) biochemical engineering and (ii) medicinal chemistry. One project related to enzyme engineering and its application in medicine and two dealt with infrastructure projects.

An important piece of work completed during the year was the purification to homogeneity of the sialic-acid binding protein, Carcinoscorpin, which was isolated from the haemolymph of the Indian horseshoe crab. An expensive biochemical, this is extremely useful for purifying biologically active sialoglycoproteins of diagnostic and therapeutic interest. The amoebocytes of this animal yield a lysate which can sensitively detect pyrogens in pharmaceutical and biological fluids. This finding is responsible for a pyrogen testing kit developed by the institute in partnership with industry.

For assessing the health status of individuals and for monitoring drug levels in patients on long-term therapy, the laboratory evolved techniques for determining estriol, estradiol, progesterone, and digoxin. A pharmaceutical company has shown interest in the development of cheap test kits based on the techniques.

The abundantly growing weed *Kallstroemia pubescens* was assessed further as an alternative commercial source of diosgenin. As an extension work on the identification of potentially viable sources of diosgenin, a highly sensitive enzyme immunoassay method has been developed for diosgenin estimation, which could be useful for evaluating various plants as diosgenin source.

On tissue-specific targeting of drugs, earlier studies had shown that by attaching galactase and mannose to liposomal surface, it was possible to target liposome-entrapped drugs to parenchymal and non-parenchymal cells of liver respectively. Attempts were under way to tailor liposomes to size, charge and composition so that targeting to other tissues may be possible. The advantages of tissue-targeting are reduction in the effective dose and the minimization of the untoward side effects of drugs. Studies on the utility of liposomes as drug carriers in oral use were also started.

Under the project on residue utilization, two hormones—human chorionic gonadotropin and glucagon—were isolated respectively from the urine of pregnant women and pancreas from abattoirs; these were purified by using partition principles.

A new method of total synthesis of the alkaloid (±)-vincadifformine starting with 2-hydroxytryptamine and 4-ethyl-4-formyldimethyl pimelate was worked out. Besides, an improved process for the preparation of urea stibamine, a patent drug for the treatment of the parasitic disease kalaazar, was developed.

During the year under review 66 papers were published, and 52 presented in symposia/conferences. As part of its silver jubilee, the institute organized a number of seminars and symposia. □

CONFERENCE BRIEFS

ULTRASONICS INTERNATIONAL-83

Shri Mukesh Chandra of National Physical Laboratory (NPL), New Delhi, attended the Ultrasonics International-83 Conference and Exhibition held at Dalhousie University, Halifax, Canada, 12-14 July. The conference, organized every alternate year, was 14th in the series and was sponsored jointly by the journal *Ultrasonics*, Canadian Acoustical Association and Canadian Society for Non-destructive Testing. Shri Chandra's report:

The inaugural session was followed by the presentation of an invited paper entitled 'Applications of ultrasonics in aerospace' by Prof. J.S. Heyman of USA. Presented and discussed at the UI-83 were 101 papers including 12 invited papers from 125 delegates from

To optimize the conditions, parameters such as temperature (50, 60, and 70°C), monomer concentration (AN-co-St - 0.105, 0.210, 0.315, and 0.420 mol/litre; AN-co-*n*-BMA - 0.222, 0.444, 0.666, and 0.888 mol/litre) and initiator concentration (4.932, 9.865, 14.797, and 19.728 $\times 10^{-3}$ mol/litre) were varied.

The percentage of grafting was found to increase with increase in temperature, monomer concentration, and initiator concentration for both the systems. But the grafting efficiency which increased initially levelled off after a maximum.

The thermal stabilities of the casein and casein-graft-copolymer systems were studied by means of a thermogravimetric analyzer, and the tensile properties of the films obtained with a few random samples of the systems were evaluated. Of a number of copolymer solutions, two were used on leather as top-coat finish. The colour fastness (dry and wet) increased in the two systems in comparison with the control casein.

Flexural endurance increased appreciably in both the systems. A significant improvement in the colour fastness was found in the case of the casein-g-AN-co-*n*-BMA system. As casein is prone to attack by microorganisms, mould growth, etc., commercial samples like Binder U are invariably protected by adding about 0.1% *p*-chloro-*m*-cresol. The graft copolymer systems obtained in the study were unaffected by mould growth, putrefaction, etc. even after storage for two years. A conclusion of the study is that the system (casein-g-AN-co-*n*-BMA) can be used for commercial exploitation.

Shri Lakshminarayana, who carried out the study under the guidance of Prof. J.N. Chatterjea of the Chemistry Department of Patna University and Dr C. Rami Reddy of CLRI, was awarded Ph.D. degree (1983) by Patna University for his thesis based on the study. The study was carried out in this CSIR laboratory. □

Biochemical characterization of APase of *Vibrio cholerae*

The synthesis of alkaline phosphatase (APase; EC 3.1.3.1) by two strains of *Vibrio cholerae* belonging to Inaba and Ogawa serotypes has been examined in relation to phosphate concentration of the culture medium. The study was made at Indian Institute of Chemical Biology (IICB), Calcutta, by Shri Nirmal Kumar Roy. The researcher found that the enzyme synthesis was repressed in cells grown in the presence of a high concentration of inorganic phosphate. Lowering the phosphate content of the growth medium led to derepression of enzyme activity. The presence of glucose in the low-phosphate medium stimulated the degree of derepression. The synthesis of the enzyme by the hypertoxinogenic strain 569B was more sensitive to inorganic phosphate than that by the mildly toxinogenic strain 154. The enzyme was located in the periplasmic space and was released when the organisms were converted to spheroplasts.

While the enzyme from the strain 569B was stable, that from cells of strain 154 was unstable *in vivo*. The stability of the enzyme from cells of strain 569B *in vivo* was reduced during laboratory maintenance of these cells along with the reduction of toxinogenecity. However, animal passage of laboratory strains increased the level of toxinogenecity and restored the stability of the enzyme *in vivo*.

The properties of APase purified from cells of strains 569B and 154 were thus examined in this context. APase was purified to homogeneity from these two strains of *V. cholerae*. Unlike APases from all other sources studied so far, enzymes from both strains of *V. cholerae* are single polypeptides of molecular weight 60,000 having a *p*H optimum around 8.0. APases from all other sources are dimeric proteins exhibiting negative cooperativity and the monomeric units are inactive at least in *E. coli*. Furthermore, while the enzymes from other sources are routinely assayed in the presence of 1 *M* NaCl or are extracted by 1 *M* $Mg(CH_3COO)_2$, the enzymes from *V. cholerae* cells were inhibited at very low concentrations of these metal ions. Although the enzyme from cells of strain 154 was unstable *in vivo*, the purified enzyme was stable. These properties of *V. cholerae* APase call for a further study of the protein, according to the researcher.

Shri Roy, who worked under the guidance of Dr J. Das of IICB, was awarded Ph.D. degree in biochemistry (1982) by Calcutta University for his thesis based on the study. □

Repair of UV-induced DNA damage in *Vibrio cholerae*

The efficiencies of DNA repair systems are subject to evolutionary pressures and the rate of evolution of a species may be coupled to the efficiency and discrimination of its repair process. This fact prompted a researcher, Shri Goutam Das, at Indian Institute of Chemical Biology (IICB), Calcutta, to study the repair of DNA damage induced by ultraviolet light in *Vibrio cholerae*. All strains of *V. cholerae* differing in serotypes and/or toxinogenecity examined so far are 7 to 10 times as sensitive to UV light as *E. coli* B cells. Although these cells are proficient in repairing DNA damage by photoreactivation mechanism, they do not possess efficient dark repair systems. The mild toxinogenic strain 154 of classical vibrios lacks excision repair mechanism, and studies of irradiated cell DNA indicate that the UV-induced pyrimidine dimers are not excized. Unlike in other systems, UV-irradiated *V. cholerae* cells can be further photoreactivated after saturation of dark recovery, suggesting a possible coordination between the incision and excision steps in the excision repair scheme provided the photoreactivating enzyme of this organism has the same

Presently in charge of the pilot plant for the production of fibre-reinforced plastics (FRP), Dr Rao is engaged in the development and fabrication of several FRP components for various aerospace and non-aerospace applications. □

Complexing of leather lipid lubricants

At Central Leather Research Institute (CLRI), Madras, a researcher has worked out a new approach for preparing leather lubricants containing reactive groups which can be used as fatliquoring agents or tanning-cum-fatliquoring agents to confer a high percentage of substantive fat to the leathers as compared with conventional systems. The researcher, Smt. K. Vijayalakshmi, prepared the fatliquoring agents by reacting long-chain aliphatic fatty acids with ethanol amines and further by reacting the amides so formed with a straight-chain dicarboxylic acid or with a reactive monocarboxylic acid. The tanning-cum-fatliquoring agents were prepared through coordination of the reactive fatty products with chrome whose coordinately held water molecules are displaced by the ligands present in the fatty material. The products were characterized by physico-chemical methods.

The process utility of the products was evaluated by working out two typical processes for full chrome upper and grain garment leathers. Comparative studies of the reactive fatliquors and tan-cum-fatliquor products with conventional fatliquors (sulphated and sulphited oils) were made. Leathers with improved properties and containing non-extractable fat were obtained. The results have established that the experimental products containing functional reactive carboxyl groups are able to coordinate with chrome. The chrome fatty complexes that are formed contained most of the fatty portion used for the reaction and were cationic. The reactive products when used as fatliquors (as high as 70% fat) bound to the chrome-tanned protein substrate which cannot be extracted with the solvent. Such binding is attributed to the coordinating nature of the compound.

The physical strength properties of the experimental leathers were found to be better than those of the control. This could be attributed to the more uniform distribution of the fat in the bound form in the different layers of leather — a conclusion corroborated by microscopic studies.

In practical trials, leathers treated with the products developed were comparable to control leathers with the advantage that the system cuts down the number of unit operations. The substantive binding of the fat to leather may be particularly useful in the preparation of leathers resistant to dry-cleaning. The softness and the strength characteristics of the leathers seem to be determined to a very great extent by the distribution of bound fat rather than of free fat.

The present investigation has made it possible to prepare new types of fatliquors possessing functional reactive groups by a method different from the one adopted for conventional fatliquors. The products can be used either as fatliquoring agents as such or after complexing with chrome as tanning-cum-fatliquoring agents.

Smt. Vijayalakshmi, who carried out the study under the guidance of Prof. J.N. Chatterjea of Patna University and Dr K.S Jayaraman of CLRI, was awarded Ph.D. degree (1983) by Patna University for her thesis based on the study. □

Total synthesis of vincatine and vincadifformine

At Indian Institute of Chemical Biology (IICB), Calcutta, a researcher, Shri Pulak Kumar Chakraborty, has attempted the condensation of 2-hydroxytryptamine with dimethyl-4-ethyl-4-formyl pimelate. In previous investigations the reaction yielded two stereoisomeric oxindoles, one of which was used for the synthesis of quebrachamine. During the present investigation, the reaction yielded a mixture of all the four possible tetracyclic oxindole lactams. The four isomers were separated and their stereochemistry was established through H and ^{13}C NMR spectroscopy. N-Methylation of the four oxindole lactams followed by selective reduction of the δ-lactam group by thiolation and Raney nickel desulphurization yielded the four possible stereoisomers of the alkaloid vincatine, isolated from *Vinca minor*. This is the first total synthesis of vincatine and as the stereochemistry of the alkaloid was not known, the present synthesis also establishes the stereochemistry of the alkaloid. Equilibration of vincatine and its isomers under different conditions have been studied.

A modified synthesis of the alkaloid vincadifformine has also been achieved. Thiolation and desulphurization of the oxindole lactams mentioned above followed by equilibration yielded an equilibrium mixture of oxindole amines. The imino-ethers of this mixture on base-catalyzed cyclization yielded racemic vincadifformine.

Shri Chakraborty, who worked under the guidance of Dr E. Ali of IICB, was awarded Ph.D. degree (1983) in chemistry by Calcutta University for his thesis based on the study. □

Grafting of acrylic monomers onto casein

Casein, a phosphoprotein used for glazable top-coat finish of leather, provides utmost satisfaction as far as gloss, flexural endurance, and glazing are concerned. However wet and dry rub resistance are poor and hence casein needs modification. This prompted a researcher, Shri Y. Lakshminarayana, of Central Leather Research Institute (CLRI), Madras, to attempt modification of casein finish by grafting acrylonitrile-co-styrene (AN-co-St) and acrylonitrile-co-*n*-butylmethacrylate (AN-co-*n*-BMA) onto the casein backbone.

the preparation of car-4-ene-3-ol, an important intermediate in the conversion of (+)-3-carene to bioactive pyrethroid insecticides. The methods reported in literature for the synthesis of car-4-ene-3-ol are cumbersome and uneconomical because they give low overall yields and involve drastic experimental conditions or toxic chemicals. The NCL method is facile, easily applicable to large-scale preparations, and yields the required intermediate in about 70% yield over three steps from the abundantly available (+)-3-carene. The process consists in reacting α-epoxycarene with thiophenol and oxidizing the hydroxy sulphide so obtained with hydrogen peroxide to get the hydroxy sulphoxide, which on pyrolysis yields car-4-ene-3-ol.

* * *

Indian Pat. 906/Del/82 (filed)

Ergometrine through fermentation with a new strain of Claviceps paspali

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Central Institute of Medicinal and Aromatic Plants
Lucknow 226016

For commercial production of ergot alkaloids three methods are available: (i) isolation of alkaloids from ergot sclerotia cultivated on rye, (ii) partial or total synthesis, and (iii) fermentation of the ergot fungus. However, technology for the production of ergot alkaloids by fermentation is available with only two or three multinational companies.

The invention covered by the patent describes a new strain of *Claviceps paspali*, isolated from India, which produces ergometrine in large quantities when grown in submerged culture.

The second major compound produced by the fungus during fermentation is lysergic acid amide, a valuable precursor for the synthesis of therapeutically important ergot alkaloids. The process thus offers a sophisticated technology for the production of ergot alkaloids. Ergometrine and its semi-synthetic derivatives are the drugs of choice for the treatment of postpartum haemorrhage. □

FOOD TECHNOLOGY
COURSES AT CFTRI

The 17th batch of students completed the two-year (1981-83) M.Sc. course in food technology conducted by International Food Technology Training Centre and second batch of students completed the ten-month course on milling technology conducted by International School of Milling Technology, both located at Central Food Technological Research Institute, Mysore.

At the valedictory function held on 15 July, Dr H.A.B. Parpia, of UN University, Tokyo, underscored the significance of the training courses at CFTRI which have been designed to mould the trainees to meet the challenges faced by developing countries. □

PERSONNEL NEWS

Appointments/Promotions

DR T.N. SINGH

Dr Tribhuwan Nath Singh, Scientist EI, of Central Mining Research Station (CMRS), Dhanbad, has been appointed Scientist F (8 Aug. 1983).

After obtaining his B.Sc. (mining engineering) degree from Banaras Hindu University (BHU), Varanasi, in 1963, Dr Singh (born 1 July 1939) has been with CMRS ever since. The first recipient of Ph.D. from Indian School of Mines, Dr Singh also obtained Ph.D. from BHU.

One of Dr Singh's main contributions is the development of a novel technique, known as equivalent material mine modelling technique, based on geological and geomechanical characteristics of Indian coal measures. The application of the technique has helped improve the safety, conservation and recovery of minerals from thick seams as also seams underneath built-up areas, water bodies, and virgin deposits. The technique also enables define the support resistance for the Indian coal measures, which are normally massive in nature.

Dr Singh is recipient, in recognition of his outstanding contributions in the field of mining engineering, of National Mineral Award for 1980-81, worth a cash prize of Rs 6000. He has also won the MGMI Silver Medal for 1969.

Recognized internationally for his work, Dr Singh was invited in 1979 to introduce the equivalent material mine modelling technique at University of Newcastle upon Tyne, UK, and was offered a visiting lecturership. Here he studied the problem of mining under the North Sea for (UK) National Coal Board and proved the utility of the technique in such cases—a piece of work which earned him an M.Sc. in mining of the university. The geometry of tunnel proposed to be constructed around Mecca under Mona Development Project of the Kingdom of Saudi Arabia was also studied by him.

Dr Singh has to his credit 44 technical papers. □

Honours & Awards

YOUNG SCIENTISTS AWARD
TO H.V. RAM BABU OF NGRI

Shri Hari Venkata Ram Babu of National Geophysical Research Institute (NGRI), Hyderabad, is among the scientists named by Indian National

Science Academy for receiving its 'Science Academy Medal for Young Scientists' for the year 1983. The award

is in recognition of his developing diagnostic characteristics of magnetic anomalies to shed light on the nature of causatives and a comprehensive analysis of these features for interpreting model parameters which have applications to gravity and self-potential data also.

Shri Ram Babu (born 24 April 1951) received his M.Sc. (Tech.) degree in exploration geophysics, in 1975, from Osmania University. As a research scholar with this centre, he participated in a few short-term research projects for exploring groundwater and mineral deposits by using electrical resistivity methods. Joining NGRI's Airborne Surveys Group in 1977, he participated in its various exploration activities. A member of the Association of Exploration Geophysicists and of the Indian Geophysical Union, Ram Babu has published 20 research papers. □

Obituary

SHRI A. CHAKRAVARTY

Shri A. Chakravarty, 51, Scientist F, of Central Mechanical Engineering Research Institute, Durgapur, passed away on 17 July at Madras.

Shri Chakravarty (born 30 Oct. 1932) graduated in mechanical engineering from Banaras Hindu University in 1953, obtained his master's degree in engineering from London University in 1961, and postgraduate diploma in production engineering from Imperial College of Science and Technology, London. After serving in various organizations, he joined CMERI on 2 March 1970 as Scientist F and was posted to head the MERADO Centre at Madras where he continued till July this year. He has to his credit three patents. □

ANNOUNCEMENTS

International Symposium on Medicinal & Aromatic Plants

The title symposium is being organized by Central Institute of Medicinal and Aromatic Plants, Lucknow, on 27-28 December 1983. Topics which the symposium will address include: structure and activity of natural products, bio-organic chemistry, pharmaceutical biology, genetics and plant breeding, and process development in pharmaceutical industry.

Further information obtainable from Dr R.S. Thaker, Convener, International Symposium on Medicinal and Aromatic Plants, CIMAP, Post Bag No. 1, P.O. Ram Sagar Misra Nagar, Lucknow 226016. □

COUNCIL OF SCIENTIFIC & INDUSTRIAL RESEARCH

Advertisement No 15 83

Director—CSIR Complex, Himachal Pradesh

The Council proposes to appoint a coordinating director for the CSIR Complex at Palampur (Kangra, Himachal Pradesh).

This CSIR laboratory has the main objective of undertaking R&D programmes to put to effective use the agricultural byproducts, medicinal and aromatic plants, forest and mineral resources of Himachal Pradesh and help in the industrialization of the region. The principal areas of R&D relate to: technologies based on forest wealth including utilization of wastes; tea; cultivation and processing of medicinal and aromatic plants; horticultural products; packaging methods and materials; and biomass and renewable sources of energy. It will also undertake forward-looking high-quality basic research in biotechnology.

The coordinating director is expected to provide a high-level leadership to multi-disciplinary teams of research scientists from different disciplines and institutes in the formulation and implementation of R&D programmes and projects of relevance to the region and of significance to national development. He will coordinate the research activities of the constituent units of the Complex devoted to areas mentioned above and develop appropriate mechanisms of technology transfer. He should have the ability to establish rapport with academic and professional institutions and governmental agencies dealing with all aspects of development of Himachal Pradesh.

Qualifications & Experience: High academic qualifications in biological sciences/chemistry/-chemical engineering with proven record of excellence in R&D in areas mentioned herein and aptitude for R&D management.

Salary Conditions of Service: The scale of pay attached to the post is Rs 2500-125/2-3000 plus allowances in accordance with the central government rules. Higher initial pay can also be considered. Consultancy earnings subject to an upper limit of Rs 15,000 per year, free medical aid and leave travel concession for the family are permissible, and residential accommodation in the campus on payment of rent is available.

Age: Preferably below 50 years, relaxable in deserving cases. This is a contractual appointment initially for a period of six years. The contract is extendable and the incumbent can also be confirmed.

Those interested may send their curriculum vitae in duplicate in the form to be obtained from the office of the Council and send the completed forms to the Joint Secretary (Administration), Council of Scientific & Industrial Research, Rafi Marg, New Delhi 110001, on or before 15 *October* 1983. Literature about this CSIR Complex will also be made available, on request, from this address.

A duly constituted screening committee will decide on the number of scientists to be invited to meet the full selection committee. The decision of the Council in this behalf will be final.

Applications from employees working in government departments, public sector organizations and government-funded research agencies will be considered only if forwarded through proper channel and with a clear certificate that the applicant will be relieved within a month of receipt of the appointment orders. □

Scientists F

The Council proposes to appoint two Scientists F (scale of pay Rs 2000-125/2-2500), one each at Indian Institute of Chemical Biology (IICB), Calcutta, and Central Salt & Marine Chemicals Research Institute (CSMCRI), Bhavnagar, and one Scientist F (scale 2000-125/2-2500 or Rs 2250-125/2-2500-EB-125/2-2750) at Central Institute of Medicinal and Aromatic Plants (CIMAP), Lucknow, and one Scientist (Engineer) in the same scale at Centre for Cellular & Molecular Biology (CCMB), Hyderabad. The respective discipline/area and the deadline for sending curriculum vitae are: (i) Post at IICB (Advt. No. 18/83): Microbiology, Immunology, and Pharmacology—26 *October* 1983; (ii) Post at CSMCRI (Advt. No. 20/83): Plant Physiology—26 *October* 1983. Those who had responded to CSIR Advertisement No. 17/80 (Post No. 1) need not apply again; (iii) Post at CIMAP (Advt. No. 17/83): Agricultural Sciences with specialization either in agronomy or genetics and plant breeding—19 *October* 1983; (iv) Post at CCMB: Engineering with proven ability of management of services and maintenance—26 *October* 1983.

Further details and prescribed pro forma for sending the curriculum vitae obtainable from: The Joint Secretary (Administration), CSIR, Rafi Marg, New Delhi 100001. □

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CSIR NEWS

A SEMI-MONTHLY HOUSE BULLETIN OF CSIR

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Colour TV receivers based on CSIR know-how to be commercially produced

For setting up a demonstration plant for the production of colour TV sets based on the know-how developed by Central Electronics Engineering Research Institute (CEERI), Pilani, a memorandum of understanding has been signed between National Research Development Corporation of India (NRDC) and Central Electronics Ltd, Sahibabad. The memorandum, signed on 31 May, stipulates terms and conditions for sharing the total estimated expenditure of Rs 25 lakh for setting up the demonstration plant, its realization and subsequent sharing of royalties when know-how is passed on to third parties.

With this, the transfer of know-how on colour TV receivers to CEL has started. One engineer from CEL was with this CSIR laboratory in June for a week, when he was exposed to colour TV technology.

On 1 August, NRDC and CEL entered into an agreement for setting up the demonstration plant for colour TV sets based on CEERI know-how. This would involve the setting up of a unit which would not only make it possible for CEL itself to go into commercial production of colour TV sets, but also be a source of commercial production technology for others wanting to take up manufacture. The two organizations will invest in it jointly to the extent of Rs 25 lakh. The phase of installation of equipment and fabrication and testing of the first lot of 100 sets, etc. is expected to be completed by the first quarter of 1984.

After successful completion of the demonstration plant, expectedly by March next year, it is proposed that CEL will go into commercial production and also provide know-how to those parties who may want it on a turnkey basis. If in the meantime there are parties which already have expertise in TV manufacture, the transfer of knowhow could start even earlier on a parallel path.

Engineers from CEL who visited CEERI in August were given manuals relating to: bill of materials (indigenous and imported); total list of test equipment; drawings of mechanical components and sub-assemblies; complete set of circuit diagrams; and details of wound coils.

Two CEL engineers have started receiving training. Further steps in technology transfer have been initiated. □

Manganese ore pan-sintering plant inaugurated

A manganese ore pan-sintering pilot plant (50 tonnes/day) set up at the Ferro Alloys Corporation Ltd, Shreeramnagar, Andhra Pradesh, and based entirely on the process and design engineering know-how developed by Regional Research Laboratory (RRL), Bhubaneswar, was inaugurated on 15 August by Prof. P.K. Jena, the laboratory's director. The sinters produced during trial runs were found to be highly suitable for producing ferro-manganese. This development thus marks another milestone in the efforts to conserve mineral resources. Some 15,000 tonnes of manganese ore fines, worth about Rs 60 lakh, could be utilized annually.

For conserving and utilizing the limited reserves of manganese ore, it is essential to utilize the ore fines as well as concentrates of low-grade ores by agglomeration. Of the various agglomeration techniques, pan-sintering is the most suitable technique under Indian conditions because of low-capital investment and considerable reduction in energy requirement.

The same team of scientists from this CSIR laboratory had set up an iron ore pan-sintering plant of 60 tonnes per day at Kalinga Iron Works, Barbil. This has been working successfully for the last five years, and the use of fluxed iron ore sinters has resulted in considerable improvement in the performance of the low-shaft furnace for pig-iron production.

The expertise available with RRL-Bhubaneswar, could be utilized by mine owners and engineering organizations to set up bigger sintering plants. □

Titan: a new mineral tanning material

A laboratory process for the preparation of a tanning salt, Titan, has been

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worked out and successfully applied for tanning hides and skins. The research was carried out by Shri M.P. Swamy of Central Leather Research Institute (CLRI), Madras.

With titania pulp ($TiO_2.x\ H_2O$) as a starting material and sodium citrate as a marking agent, a 50% basic salt (Titan) is obtained. The spray-dried powder contains three different species of titanium—cationic, 52%; anionic, 40%; and non-ionic, 8%—being predominantly cationic. The powder is stable for months and does not lose its tanning properties; it is freely soluble (100%) in cold water. It is competitive in cost with the existing mineral tanning agents. The raw material in the form of its ore is abundantly available in India (about 10% of the world reserve).

The chemical characteristics of the salt have also been studied by the researcher. A patent for the process for manufacturing Titan has been filed. The optimum conditions required for titanium tannage and its mechanism have also been worked out. The titanium-tanned leather (shrinkage, temp. 85°C) is slightly yellowish white in colour, possessing greater fullness similar to vegetable-tanned leather. The leather is amenable to pastel shades, having equal affinities for both acidic and direct dyes and also for anionic fatliquors. Unlike in the chrome-tanned leather, the dye penetration and its evenness in the titanium-tanned leather are excellent.

The strength properties and other chemical characteristics of leathers obtained through different combination systems, namely titanium-chromium, titanium-syntan, titanium-aluminium, and titanium-vegetable tannins, were also studied comprehensively.

The major advantage of titanium tannage is that it is absolutely free from pollution unlike other tanning systems.

Shri Swamy, who carried out the study under the guidance of Dr J.N. Chatterjea, Professor and Head of the Department of Chemistry, Patna University, and Dr J.B. Rao, Emeritus Scientist, CLRI, was awarded Ph.D. degree (1983) by University of Patna for his thesis based on the study. □

Analysis of biological phenomena from non-equilibrium thermodynamics

Considering the confusion that might arise from the different notions of linearity or steady-state concept, a researcher, Shri Anjan Kumar Dasgupta, at Indian Institute of Chemical Biology (IICB), Calcutta, has proposed a schematic classification for describing systems in which non-equilibrium processes are operative. The non-linear systems with non-linear dynamic descriptions have been shown to exhibit the differential stability behaviour with respect to different orders of perturbation. This has been illustrated in terms of Lotka-Voltera model.

Conditions for the existence of non-equilibrium steady-states in enzymatic reactions have been examined and kinetic parameters for such reactions are considered to be time-dependent variables at the steady-state. It has been shown that for enzymes with multiple binding sites the change in the number of reactive sites or the steady-state might result in non-zero velocity even when the kinetic parameters are time independent.

A plausible thermodynamic model for lysis of living cells has been proposed by correlating membrane fluidity and transport properties according to biological membranes. The analysis presented in the study suggests that when the rate of internal entropy production exceeds a certain value, the regulatory mechanisms involved in the transport of solutes across the membrane break down. Conditions describing the stability of the membrane structure have been analyzed.

Near-equilibrium chemical oscillation has been theoretically ruled out. Such oscillations might have a significant role in many vital metabolic events, particularly in prebiotic evolution. The plausibility of oscillation in near-equilibrium state has been investigated and it has been found that such oscillations cannot be ruled out for chemical reactions for which the determinant of the linearized rate coefficient matrix vanishes. However, the equilibrium state will be asymptotically steady provided the fluctuations are small and the oscillations will be damped.

Organismic ageing is a universal phenomenon in the living world, leading to senescence. No macroscopic analysis of the phenomenon is yet available. The present study has given a macroscopic description of the phenomenon of organismic ageing. The necessary condition for ageing is considered to be a higher transition probability of the dissipative structure of the living organism to equilibrium structure. It has been proposed that the sufficient condition implying such a necessary condition may be non-unique. One such sufficient condition is the decrease in the plausibility of cyclic reaction with age. It has been proposed that without such cycles the steady state would reduce to the equilibrium state provided the fluctuations are Gaussian. The sufficient condition for equilibrium approach also fails if the living system is considered to approach isolation accompanied by gradual cessation of energy flow.

Shri Dasgupta, who worked under the guidance of Dr J. Das of IICB, was awarded Ph.D. degree in physics (1983) by Calcutta University for his thesis based on the study. □

ICMA-RRL (Hyderabad) Get-together

Speakers at a get-together between scientists of Regional Research Laboratory (RRL), Hyderabad, and representatives of Indian Chemical Manufacturers Association (ICMA) stressed the need for building closer links between industry and the research

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system in the country in order to develop internationally competitive technologies based on indigenous know-how. The get-together was held at RRL-Hyderabad on 3 September.

The discussions revealed that investment in R&D in India, specially in in-house R&D in industry, is not adequate to bridge the technological gap between this country and the advanced countries. The get-together emphasized that all possible steps should be taken to encourage indigenous technology by disallowing import of technology where indigenous know-how is available and, where import of technology is unavoidable, by taking necessary steps to absorb, develop, and update the technology so imported through adequate investment in R&D. One of the important suggestions was that ICMA and CSIR should jointly identify five or six major projects of national importance on which R&D programmes could be taken up on a priority basis.

The highlights of the current R&D programme of the laboratory were presented by senior scientists of the laboratory. The meeting was addressed, among others, by Dr G.S. Sidhu, Director General of CSIR. □

PROGRESS REPORTS

NISTADS Annual Report: 1982-83

The projects of National Institute of Science, Technology and Development Studies (NISTADS), New Delhi, according to its annual report for 1982-83 published recently, were concerned with: (1) Planning, organization and sociology of research, (2) Historical, philosophical, ethical and social dimensions of science, (3) Development processes (industrial development) and technology transfer, (4) Technology assessment, and (5) Regional S&T policy studies. With the transfer of the Centre for Management Development in R&D to NISTADS in August 1982, R&D management and training also became one of the major activities of the institute.

Among the significant studies completed during the year mention may be made of: International comparative study on the efficiency of research units, and Progress of science and technology in the Asian and Pacific Region (1966-82). Other studies completed include: Transfer of technology from CSIR laboratories to industry, and Role of parliament in science and development in India. Studies that were being continued relate to: S&T awards and their impact on the promotion of excellence in India; Sociological study of the organizational climate for R&D; Design and development of an information system for CSIR; Cultural and philosophical roots of the scientific tradition; Culture and mathematics; Development of scientific societies in India during the nineteenth century; Science and technology as vectors of change in the arts and mass media (1947-84); Technological development in the small-scale sector and the unorganized sector of industry through linkages with the large sector; Control of pest infestations: policies for the pesticide industry in India; Electrical equipment in India—problems and prospects; Advanced technologies in the Third World development: a study of technology diffusion from Bhabha Atomic Research Centre and Indian Space Research Organisation; Energy development and environment—a study of national energy policies in various sectors; Impact of biotechnologies; and Technology and international politics of application satellites.

NISTADS initiated studies also in a number of collaborative/sponsored research projects. Some of these are: Policies of integrating S&T development with social and economic goals; Comparative study of the macroplanning processes of India and GDR (in collaboration with Institute of History and Organisation of Science, Academy of Sciences of GDR); Technology assessment and promotion of technology for development of self-reliance (in collaboration with the International Centre for Methodology for Future Development, University of Bucharest, Romania); Role of Indian financial institutions in the development of science and technology (in collaboration with Centre for Applied Systems Analysis in Development, Calcutta, and State Bank of India); Studies on the history of science and technology in medieval India; Studies in the history of science in ancient India; and Study of scientific and technological development policies in west Asia and north Africa.

Two important seminars organized were: Role of Frontier Technologies in Third World Countries; and Role of Fundamental Research in Developing Countries. Proceedings of the International Seminar on Priorities in Science were published. NISTADS continued to publish the monthly periodical *Current Literature on Science of Science*. □

Insdoc Annual Report: 1981-82

The annual report of Indian National Scientific Documentation Centre (Insdoc), New Delhi, for 1981-82 shows how this CSIR constituent continued to provide a full range of documentation, translation and other back-up services to the scientific community.

During the period, Insdoc (Delhi) registered about 17,000 orders and complied with about 16,000 requests. The regional centre at Bangalore registered about 5000 orders; the regional centre at Calcutta, about 1600 orders; and the Madras centre, about 200 orders. More than 20,000 copies of documents were supplied to scientists and technologists during the year.

As a part of its information service, Insdoc handles requests for compilation of *ad hoc* bibliographies on specific topics. Particular mention may be made of the compilation, by Insdoc's Russian Science Information Centre and the Russian Science Digest Service projects, of a comprehensive bibliography of Soviet and East European literature on

sorghum and millets, covering the period 1971-81, on behalf of ICRISAT, Hyderabad. The Madras regional centre compiled a bibliography on carbon fibre by searching CA(C) tapes through computer.

Through its translation service, Insdoc provided over 1000 translations from 20 foreign languages, involving over 13,500 typescript.

The printing section has built up a potential for undertaking printing of 30,000 to 35,000 pages, of which in-house publications account for 10,000 pages. Information dissemination activities are in the nature of secondary publications, with the exception of the Annals of Library Science and Documentation. Some of the important publications are: Indian Science Abstracts (ISA); Russian Scientific and Technical Books—An Accession List; Contents List of Soviet Scientific Periodicals; Russian Science Digest; National Index of Translations (NIT); Annals of Library Science and Documentation; and state-of-the-art reports.

The computer-based information activities of Insdoc relate to SDI service, union catalogue processing, ISA index preparation, National Index of Translations, processing of data for the centralized acquisition of periodicals project and preparation of various listings for directory-type publications being brought out by Insdoc.

Insdoc continued to receive three databases, namely CA Search, INSPEC, and COMPENDEX for its SDI services. A new search programme was developed for INSPEC detabase for processing through CYBER computer of NIC. Similarly, efforts were also made to develop a suitable search programme for using the COMPENDEX database and to start the service. A pilot fascicule of 'Union Catalogue of Scientific Conference Proceedings' was brought out, using the IBM 360/44 computer system.

In addition, indexes to ISA and NIT are being prepared in the HP 1000 series instead of the IBM 360/44 computer system as was previously done.

In the centralized acquisition of periodicals project, computer processing was done, by using the IBM 360/44 computer, for preparing a laboratory-wise listing of indents for periodicals, titles of periodicals directory, and publishers directory for the 1982 subscription orders. Seven accounting lists relating to 27 laboratories, 878 publishers, 2309 titles of periodicals and 3511 copies of periodicals were processed.

The revision of the Directory of Current Research Projects in CSIR laboratories was in progress.

With regard to the Union Catalogue of Scientific Periodicals in Indian Libraries, compilation of holdings data of scientific serials in 785 institutes was completed. Work on the Union List of Current Scientific Serials in Indian Libraries was started.

The National Science Library acquired 3752 documents during the year.

The Russian Science Information Centre received 1400 books from VINITI, Moscow, besides 230 titles of periodicals regularly received. About 2400 books received under this programme were processed.

Some 16 publications were printed during the year for other organizations. □

CONFERENCE BRIEFS

Sixth International Congress on Photosynthesis

Dr P.V. Sane of National Botanical Research Institute, Lucknow, participated in the International Congress on Photosynthesis, held in Brussels from 1 to 6 August. Dr Sane's report:

The congress was attended by over 900 scientists working on different aspects of photosynthesis. Through 10 plenary lectures, 20 symposia, and about 750 poster presentations, the congress reviewed the progress since the last congress. Aspects discussed included structure, biochemistry and biophysics of the reaction centre complexes from photosynthetic bacteria, algae, and higher plants; enzymology and regulation of carbon dioxide fixation; effects of stress conditions on the structure and function of photosynthetic apparatus; development of photosynthetic apparatus; energy migration and regulation of excitation energy distribution in the photosynthetic membrane; electron and proton transport; molecular architecture of the photosynthetic membrane; solar energy utilization by photosynthetic organisms; and organization and expression of chloroplast genome.

In most areas, rapid progress has been made in the past three years. A major development in respect of the lateral heterogeneity of the thylakoid membrane earlier shown by Sane, Goodchild and Park relates to the demonstration of the absence of photosystem I from partition regions of the chloroplast membrane. The membrane is a dynamic structure and evidence was provided for the lateral mobility of a light harvesting chlorophyll protein complex (an intrinsic membrane protein) on phosphorylation. This dynamism permits the membrane to regulate the excitation energy distribution between the two pigment systems. The not-so-well understood function of the cytochrome f/b6 complex in proton pumping was elucidated.

An interesting development during the past three years is that by using gene cloning techniques the amino acid sequence of several membrane polypeptides has been determined. Further, by using the newly developed concept of 'hydropathy plotting' the organization of the polypeptides in the membrane has been proposed.

In the biochemical aspects, besides the understanding of the enzymology of carbon dioxide fixation, the studies have provided further evidence for the regulation of not only chloroplastic but also non-chloroplastic enzymes by ferredoxin-thioredoxin system. An important development in the regulation is the identification of fructose-

2, 6-bisphosphate as a regulatory metabolite governing the synthesis and breakdown of sucrose in plants. A number of reports related to the chloroplast genome and its expression.

The light emission from photosynthetic membranes and its relation to the "S" states of the water oxidizing complex was another area discussed at the conference. Dr Sane presented the work of his group on thermoluminescence. Using specific inhibitors of the photosynthetic electron transport and water oxidizing complex it was shown that specific reducing entities located on the acceptor sides of photosystems II and I as well as the specific "S" states of the water oxidizing complex (S_2, S_3) are involved in a recombination reaction to give glow curve patterns. The involvement of photosystem I in thermoluminescence and non-involvement of the "S" state in the production of one of the glow peaks related to photosystem II was demonstrated. The conclusions drawn by this approach were as clearcut as those from flash studies conducted by other groups.

* * *

Eleventh International Congress on Acoustics

Dr T.K. Saksena of National Physical Laboratory (NPL), New Delhi, attended the Eleventh International Congress on Acoustics (ICA) held at Paris, from 19 to 27 July. The NPL scientist was on a study visit to France under the CSIR-CNRS exchange programme for research and technical survey in the area of ultrasonics. Dr Saksena's report:

Some 950 scientists, including eight from India, from 37 countries participated in the congress. Some 700 papers covered the entire field of acoustics/ ultrasonics: physics of ultrasound, infrasound, hypersound, psycho acoustics, oral communication, musical acoustics, solid state acoustics, measurement methods and measuring equipment, acoustics applied to industry and architecture, and town and country planning. Presentation on ultrasonics formed the largest single group and topics such as underwater acoustics, molecular acoustics, nonlinear propagation, low-temperature ultrasonics, acousto-optics, acoustic emission, ultrasonic visualization, and effects of ultrasound were discussed.

Twelve general lectures of contemporary interest covered: quantum acoustics, noise in oceans, electro-acoustic transducers, photo-acoustic spectroscopy, atmospheric propagation of sound, nonlinear hydroacoustics, numerical synthesis of sound, and opto-acoustics. There were also four structured sessions dealing with the problem of measurements of sound traumatism of the cochlea, and optic fibre acoustic detectors, comparative bio-acoustics, and acoustics and contemporary music. Besides, there were round-table meetings on active sound absorption, effect of noise on human health, acoustics of industrial premises, and micro-informatics and acoustics. Some of the meetings addressed themes of general interest like acoustics in developing countries, and education of students in the scientific and technical field of acoustics.

A special feature of the conference was a commemorative session for the 50th anniversary of opto-acoustics. The works of Indian scientists, Raman and Nagendra Nath, were cited, in the talk by Prof. Mertens. The work of Dr S. Parthasarathy, the noted scientist in ultrasonics who organized and headed the NPL's Division of Acoustics, was also extensively quoted by the speaker.

An exhibition of instruments was also organized, in which the products of 15 agencies ranging from sound measuring equipment to analyzers and mini-computers were displayed. □

PATENTS INFORMATION

Indian Pat. 208/Del./83 (filed)

Process for preparation of 3-acetyl-1,2,3,4,6,7,12,12b-octahydro-indolo[2,3-a]quinolizin-2-one

B.C. MAITI AND S.C. PAKRASHI
Indian Institute of Chemical Biology, Calcutta 700032

The invention provides a simple and convenient method for the preparation of the title compound. Condensation of 3,4-dihydro-β-carboline with ethoxymethylene acetylacetone yields 3-acetyl-1,2,6,7,12,12*b*-hexahydro derivative (90% yield), which on reduction with $NaBH_4$ yields the title compound (86% yield). The process could be used by the pharmaceutical industry as a key intermediate for the preparation of ajmalicine, an indole alkaloid, already in use as a hypotensive agent in many east European countries.

* * *

Indian Pat. 286/Del./83 (filed)

Modified starter for a single-phase induction motor

R.N. ROY AND P.S. TELLEWAR
Indian Institute of Petroleum, Dehra Dun 248005

A single-phase induction motor is not self-starting and hence an auxiliary starting-winding is normally provided which is 90 electrical degrees to the main or running-winding. A centrifugal switch is widely used for starting a single-phase induction motor which isolates the starting-winding mechanically as the motor picks up speed. However, owing to changes in the design of motors and centrifugal switches, it is often difficult to obtain replacement when it is damaged and takes a considerable down-time for any such repair as a centrifugal switch arrangement is incorporated inside the motor unit.

A novel starter developed at Indian Institute of Petroleum overcomes these shortcomings. The starter makes the single-phase induction motor self-starting by providing a modified start push button, having 3 contact points instead of a 2-contact point of a conventional starter. At starting, when this modified start push button is pressed, both the starting and running winding are energized and the motor starts; and as this push button is released the starting-winding is automatically cut off and the motor continues to run as usual. This new device has all the advantages in regard to the safety of the motor as in the case of a 3-phase motor starter. □

Indian Pat. 317/Del./83 (filed)

Improvements in or relating to a process for manufacture of silicon varactor diode

R.P. GUPTA, M.K. SHARMA, W.S. KHOKLE, D.P. RUNTHALA, A.K. RAY AND P.D. VYAS
Central Electronics Engineering Research Institute, Pilani 333031

The patent covers an improved process for the manufacture of silicon varactor diode for VHF/UHF television tuners. Commonly used processes for fabricating such devices employ sophisticated techniques like ion implantation or epitaxy. In the CEERI process the conventional CVD technique is coupled to thermal diffusion to produce the devices. The advantages of the process are that its reproducibility and repeatability are good. Capacitance uniformity among diodes is excellent so that the yield of the matched diodes is high. A simple planar process in which only two masking steps are employed, it is a cost-effective process, most suitable for high-volume production of the devices. The specifications of the fabricated diodes are:

Capacitance ratio C3/C2J $\geq$ 4
Breakdown voltage $\geq$ 28 V
Leakage current $<$ 50 nA at 28 V

These diodes in a VHF-TV tuner circuit result in a gain of 21-32 dB in different bands.

* * *

US Pat. 426729 (filed)

(corresponding to Indian Pat. 79/Del./82)

Improved spinning pot for twisting and winding synthetic yarn

R.V. RAMANI
National Aeronautical Laboratory, Bangalore 560017

The invention concerns improvements relating to spinning pots. These are high-speed rotating equipment used for twisting and simultaneously winding yarn in textile mills. Basically, the invention eliminates the high levels of stresses and concentration of stresses present in spinning pots in accordance with prior art. This is done by isolating the high-stress barrel from the low-stress base and joining both of them through a precise locating spigot.

Additional advantages resulting from the invention include lower weight,

Improved spinning pot—assembled (top); base and barrel separated (below)

easier and less expensive manufacture, better finish, lower power consumption, safer operation, and lesser operator fatigue.

* * *

Indian Pat. 163/Del./83 (filed)

Process for preparation of (±)-rhazidine hydrochloride

V.S. GIRI AND S.C. PAKRASHI
Indian Institute of Chemical Biology, Calcutta 700032

The patent covers the preparation of the title compound in excellent yield (85%) from (±)-quebrachamine (having hypertensive property) the preparation of which has been already achieved (Indian Pat. 148124).

The process consists in oxidizing (±)-quebrachamine with an ethereal solution of monoperphthalic acid for 30 hr at 24-28°C to give the base (±)-rhazidigenine, which with hydrogen chloride yields (±)-rhazidine hydrochloride. The advantage of the synthesis is the recovery of the perphthalic acid for further use, thereby economizing the entire process.

(±)-Rhazidine hydrochloride has anti-arrhythmic property and so could find use in the pharmaceutical industry when a thorough clinical evaluation is completed.

* * *

Indian Pat. 283/Del./83 (filed)

Process for preparation of estriol-6-carboxymethyl oxime-dehydrogenase enzyme conjugate derivatives

MRIDUL GHOSH AND B.K. BACHHAWAT
Indian Institute of Chemical Biology, Calcutta 700032

The patent covers a method for the preparation of the conjugate of estriol-6-carboxymethyl oxime to the enzyme glucose-6-phosphate dehydrogenase without loss of enzyme activity. The method consists in the preparation of the activated ester of the estriol derivative by treatment with N-hydroxysuccinimide and dicyclohexylcarbodiimide and coupling of the activated ester to the enzyme under controlled conditions. The final product is purified by gel filtration and stored in lyophilized form. The conjugate has been used in a new sensitive homogeneous enzyme immunoassay technique developed for the estimation of estriol in the urine or plasma of pregnant women to monitor foetal well-being.

* * *

Indian Pat. 114/Del./83 (filed)

Improved process for preparation of estriol 3-O-carboxymethyl ether

T.K. DHAR, E. ALI AND MRIDUL GHOSH
Indian Institute of Chemical Biology, Calcutta 700032

The patent covers the process for the preparation of estriol-3-O-carboxymethyl ether in high yield (80%) by a simple, one-step reaction. It involves reaction of estriol with bromoacetic acid and potassium hydroxide in the presence of an organic solvent at room temperature. This method is considerably superior to an earlier reported one in which the yield was only 5%.

The product can be used in place of the more expensive estriol-6-carboxymethyl oxime for the preparation of estriol-protein conjugates used for raising the anti-estriol antibody. Conjugates of this derivative with enzymes can be used for estimation of estriol, by the enzyme immunoassay

technique, in the urine and plasma of pregnant women to monitor the foetal well-being. □

EXTRAMURAL RESEARCH

Microbial transformation of a commercial sesquiterpene

A CSIR postdoctoral fellow has found that a commercial sesquiterpene, longifolene, could be transformed microbially. The researcher, Dr (Smt) Saroj N. Bhosle, carried out her studies at the Centre of Postgraduate Instruction and Research (Panaji, Goa) of University of Bombay.

Thin layer chromatogram of a commercially available longifolene sample indicated that it contained, besides longifolene (L) and longicyclene (X), a number of components, designated as Y_2, Y_1, and S_s, and polar impurities. Studies were therefore undertaken to isolate these components through column chromatography and characterize them spectrally. The components Y_2, Y_1 and S_s were identified as caryophyllene, humulene, and caryophyllene oxide respectively.

A bacterial culture capable of utilizing the commercially available longifolene as the sole source of carbon was isolated. The culture, identified as *Arthrobactor simplex* strain T_2, when inoculated in a mineral medium containing commercial longifolene, utilized the impurities during its growth, leaving a purer longifolene (L) in the culture broth. A similar observation had been reported by the researcher's team earlier, when they used a culture *Pseudomonas alcaligenes*, *T*, which was used to standardize and develop a novel microbiological process for obtaining pure longifolene.

During the growth of strain T_2 in commercial longifolene, a polar compound, designated as SL-1, was detected in the culture broth, which on isolation was found to be crystalline. Spectral analysis indicated the compound to be sativic acid, which is perhaps derived from longifolene by ring contraction, resulting in sativene skeleton. The structure was confirmed by converting SL-1 to its hydrocarbon, which was identified as sativene by comparison with authentic samples.

Among the various components of the commercial longifolene, the source from which SL-1 is formed was further investigated. It was observed that only Y_2 supported the growth of strain T_2 when supplied as carbon source, but none of the components formed SL-1, in the medium with or without the presence of simple carbon sources. However, the presence of SL-1 was detected in the culture broth when the strain T_2 was grown on the mixture of L and Y_2, indicating that perhaps SL-1 is a co-metabolic product arising from L and its formation may require the presence of Y_2.

The strain T_2 during its growth on commercial longifolene depicted emulsification of the hydrophobic substance. The emulsifying factor isolated was characterized as a phospholipid. □

PERSONNEL NEWS

Appointments/Promotions

At National Physical Laboratory, New Delhi, the following have been promoted, consequent on assessment, to the positions and from dates given in parenthesis: Dr V.D.P. Sastry (Scientist EI, 14 Feb. 1980), Shri S.K. Kapur (Scientist EI, 25 July 1980), Dr M.K. Raina (Scientist C, 2 July 1979), Shri Y.S. Reddy (Scientist C, 2 Aug. 1981), Dr L.M. Manocha (Scientist C, 16 Feb. 1982), Shri Jitendra Rai (Technical Officer C, 17 July 1980), Shri C.L. Verma (Technical Officer C, 27 Nov. 1981), Shri A.C. Prabhakar (Technical Officer C, 23 March 1982), and Shri S. Parthasarathy (Technical Officer C, 16 Nov. 1982).

* * *

At Regional Research Laboratory (RRL), Jammu, Dr K.K. Bhutani has been appointed on promotion as Scientist C (9 Aug. 1983) and Dr A.K. Saxena as Scientist B (11 Aug. 1983).

Also at RRL-Jammu, Shri H.R. Handa has been promoted as Senior Finance & Accounts Officer (5 Aug. 1983), and Shri O.P. Sharma as Art Officer B (1 Dec. 1981, on assessment).

* * *

At Central Institute of Medicinal and Aromatic Plants (CIMAP), Lucknow, Shri N.K. Srivastava has been appointed Scientist B (12 Aug. 1983).

Also at CIMAP, Shri O.P. Virmani has been promoted, on assessment, as Scientist EII (26 July 1982). Other assessment promotions at this Lucknow laboratory include those of: Shri V.K. Mehta and Shri V.P. Singh to Group-IV(I) (1 April 1981), Dr A. Misra, Dr G.D. Bagchi, Dr A.K. Singh (all from 1 April 1981), Dr H.N. Singh, Shri Ranjeet Singh, Dr A.K. Singh, Dr S.P. Jain and Dr D.C. Jain to Group III (3) (all from 1 April 1982).

Transfers

Shri H.R. Sharma, Finance & Accounts Officer, Structural Engineering Research Centre, Roorkee, has been transferred to Publications & Information Directorate, New Delhi (22 Aug. 1983).

Honours & Awards

DR VED RAM SINGH

Dr Ved Ram Singh of the Biomedical Ultrasonic Group of National Physical Laboratory (NPL), New Delhi, has won the 'Distinguished Alumni Award' of the Thapar Institute of Engineering and Technology (TIET), Patiala.

The award is in recognition of his contributions in transducer technology and biomedical engineering. Dr Singh is an electrical engineering graduate of TIET. The award was presented, among others, to Dr Singh by the President of India Shri Zail Singh at a function held on 23 April at Rashtrapati Bhavan, New Delhi. TIET celebrated its silver jubilee.

A Ph.D. in biomedical engineering and instrumentation from Indian Institute of Technology, New Delhi, Dr Singh is recipient of two other awards—the NPL's merit award (1973) and the 'Young Scientists Award' of Indian

National Science Academy (1974). He has published more than 80 research papers, holds twelve patents and has also developed three processes. A senior member of IEEE, USA, and an elected member of International Society on Bio-Telemetry of The Netherlands, he is also engaged in training and consultancy in the field of his specialism.

* * *

DR S. KUMAR

Dr S. Kumar, Director, Central Glass & Ceramic Research Institute, Calcutta, has been appointed member of the steering committee of the International Commission on Glass for the period 1982-86.

Also, in recognition of Dr Kumar's outstanding contributions in the field of ceramics, the Electro-Porcelain Division of Bharat Heavy Electricals Ltd, Bangalore, gave a special award to him at the International Seminar on Ceramics. □

ANNOUNCEMENTS

National Seminar on Participative Management of Planning, Research and Development in Mining Industry

A national seminar on the title topic is being organized by Central Mining Research Station (CMRS), Dhanbad, in collaboration with Institution of Engineers (India) (Dhanbad Sub-Centre) and Institute of Social and Business Management, Dhanbad, on 26 and 27 November 1983 at CMRS.

The seminar is expected to recommend practical strategies based on theoretically proven ideas of management sciences.

Topics to be discussed in four technical sessions are: need for participative management and identification of problem areas; management concept and techniques for participative management; procedure for management system development; behavioural analysis towards participative management; and organizational development for ensuring participative management.

Further details obtainable from: The Chairman, Industrial Relations Development Committee, Central Mining Research Station, Barwa Road, Dhanbad 826 001. □

COUNCIL OF SCIENTIFIC & INDUSTRIAL RESEARCH

Advertisement No. 21/83

DIRECTOR - RRL, TRIVANDRUM

The Council proposes to appoint director for Regional Research Laboratory (RRL), Trivandrum.

RRL-Trivandrum has the main objective of conducting R&D work in the areas of post-harvest technology of plantation products; materials technology based on natural fibres, clays and elastomers; composites; agricultural and mineral based materials relevant to the region; renewable resources of energy for local industries; and systems planning and research management.

The director is expected to provide a high-level leadership in the formulation and implementation of multidisciplinary R&D programmes and projects in the areas mentioned above. He should be able to plan and execute scientific programmes of major importance in the framework of national priorities and perspectives of research in the areas mentioned above. He should have the ability to establish rapport with academic, and professional institutions and governmental agencies dealing with all aspects of development related to above areas.

Qualifications & Experience: High academic qualifications in any one of the areas mentioned, with proven record of excellence in R&D therein and aptitude for R&D management.

Salary/Conditions of Service: The scale of pay attached to the post is Rs 2500-125/2-3000 plus allowances in accordance with the central government rules. Higher initial pay can also be considered. Consultancy earnings subject to an upper limit of Rs 15,000 per annum is permissible. Free medical aid and leave travel concession for the family are also permissible. Residential accommodation will be provided as per the usual pattern of payment of rent subject to availability. This is a contractual appointment initially for a period of six years. The contract is extendable and the incumbent can also be confirmed.

Age:Preferably below 50 years, relaxable in deserving cases.

A duly constituted screening committee will decide on the number of scientists to be invited to meet the full selection committee. The decision of the Council in this behalf will be final. Applications from employees working in government departments, public sector organizations and government-funded research agencies will be considered only if forwarded through proper channel and with a clear certificate that the applicant will be relieved within a month of receipt of appointment orders.

Those interested may send their curriculum vitae in duplicate in the form obtainable from the Joint Secretary (Administration), Council of Scientific & Industrial Research, Rafi Marg, New Delhi 110 001, on or before 26 *October* 1983. Literature about RRL-Trivandrum will also be made available on request. □

OBITUARY

SHRI R. KRISHNAMACHARI

Shri Rajagopal Krishnamachari, Scientist EI, Central Road Research Institute, New Delhi, expired on 7 September 1983 at New Delhi. He was 55.

A graduate in science from Madras University, Shri Krishnamachari had been with CRRI since 1952. His earlier research interest at CRRI was concrete technology for rigid road and airfield pavements. Deputed to Czechoslovakia for two months in 1973 under the CSIR-Czeck Academy of Sciences Exchange Programme, he underwent an advanced study in road research and construction of highways.

During the later part of his service at the institute, he switched over to research planning and management and dissemination of research information, and also headed the Planning and International Relations Division. An expert in organizing technical exhibitions and symposia, he participated in the organization of CSIR exhibitions at Sofia, Zagreb, Rio de Janeiro, and Moscow. He was awarded a special honorarium for his work for the exhibition at Moscow held in 1978. □

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Information Service

C.F.T.R.I., MYSORE

Chloroquine phosphate plant being erected

Based on the process re-standardized at Regional Research Laboratory (RRL), Jorhat, Bengal Immunity Company Ltd (BICL), a Government of India undertaking, is setting up a 80 tonnes/annum chloroquine phosphate plant at Calcutta. With an estimated investment of Rs 35 million, this plant will be one of the largest in Asia.

BICL had developed the process for the antimalaria drug chloroquine phosphate in 1954 and subsequently commissioned a 4 tonnes/annum plant at Calcutta. In 1979, the company requested RRL-Jorhat to re-standardize the process conditions and optimize the process steps. This CSIR laboratory, BICL and Bengal Immunity Research Centre collaborated in the task, which was completed in 1981. The re-standardized process was subsequently scaled up at BICL's plant. RRL-Jorhat provided basic designs for the 80 tonnes annum plant in February 1982. This CSIR laboratory interacted with Krebs & Cie (India), Calcutta, in the detailed engineering of the project.

The project, which provided challenges to the scientists of RRL-Jorhat, has demonstrated how CSIR scientists can effectively collaborate with their counterparts in industry for commercializing a process know-how developed outside of CSIR. □

Silicate analysis: rapid and accurate method

A simple and rapid method had been developed at Central Glass & Ceramic Research Institute (CGCRI), Calcutta, for titrimetric determination of silica in aluminosilicates. By this method, an accurate determination of silica can be completed within an hour as against several hours, or even days, needed by any other available method. It is being successfully used in many laboratories in the country and abroad.

Considerable attention has been paid in recent years to the titrimetric potassium silicofluoride method. This involves precipitation of silicic acid as K_2SiF_6 and finally titration of the liberated HF (on hydrolysis) with NaOH for determining silica in silica-rich materials. Because it is simple and rapid it has replaced, in many analytical fields, the conventional techniques for rapid evaluation, characterization, and quality control. But its application to aluminosilicate matrix becomes a problem owing to serious interferences from Al, Ti, Zr, and B with SiO_2.

An improved method, which has been developed recently by CGCRI, is based on the same principle as above, but it gets round the interferences by proper control of the related parameters. The method is applicable to a wide range of silicate materials including aluminosilicates. □

Amorphous nickel alloys by electro-deposition

The Central Electrochemical Research Institute, Karaikudi, has developed bath compositions for producing nickel-phosphorus and nickel-phosphorus-boron alloys containing a total metalloid content of 13%. The alloys have also been characterized. The deposits are amorphous, and possess very high corrosion resistance compared with that of the usual nickel and electroless nickel deposits.

Because of the outstanding corrosion resistance, hardness and brightness of these deposits, they find wide industrial applications. As the power requirement for this process is only 25% of that for chromium deposition, they may even replace chromium for certain specific applications.

Normally, such deposits are produced by chemical reduction. The drawback in this process is that the deposition is very slow and the composition of the deposits cannot be controlled. Deposits produced by such methods are reported to contain about 10% phosphorus. These disadvantages have been overcome by the electrodeposition processes. □

New cultivars of rose and gladiolus

Four new roses, namely Saroda, Sukumari, Tangerine Contempo, and Yellow Contempo, have been evolved, and named for release, by National Botanical Research Institute (NBRI), Lucknow. Brief descriptions of cultivars:

(i) Saroda—a mutant of rose *cv.* Queen Elizabeth with Blossom Pink

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(very light pink) flowers; (ii) Sukumari—a mutant of rose *cv.* America's Junior Miss, bearing almost white flowers at full bloom; (iii) Tangerine Contempo—a mutant of rose *cv.* Contempo, bearing Tangerine Orange flowers; (iv) Yellow Contempo—mutant of rose *cv.* Contempo, bearing Empire Yellow flowers.

The three new gladioli which NBRI has evolved, through hybridization of cultivars Friendship ($2n=60$) × *Gladiolus tristis* ($2n=30$), have been named and released this year for cultivation in the Indo-Gangetic plain. These are: (i) Manhar with mid-season blooming; requires 80-120 days to flower; av. spike length, 60 cm, one-sided, florets—Primrose Yellow (601/3); reverse side Primrose Yellow (601/3), having splashes of Tyrian Rose (24/1) on outer three petals in an irregular fashion; flowers—14-18 per spike, overlapping, 10 × 9 cm each; (ii) Manisha—mid-season, requires 80-120 days to flower, av. spike length, 60 cm, one-sided; florets white; outer three petals splashed with Tyrian Rose (24/3), more towards margins; throat Primrose Yellow (601/2), reverse side white, irregularly splashed with Tyrian Rose (24/2), flowers 14-16 per spike, overlapping, 11 × 10 cm each; and (iii) Mohini—mid-season; requires 80-120 days to flower; av. spike length, 60 cm, one-sided, florets white; outer three and inner upper one heavily splashed with Tyrian Rose (24/2 & 24/3); lower inner two sparsely splashed with the same colour, throat Primrose Yellow (601/3); reverse white splashed with Tyrian Rose (24/2 & 24/3) in an irregular fashion; flowers—12-14 per spike, overlapping, 10 × 10 cm each. □

R&D BRIEFS

Slurry transportation pilot plant

A hydraulic slurry transportation pilot plant was inaugurated at Regional Research Laboratory, Bhubaneswar, on 27 August. Set up in collaboration with Engineers India Ltd, New Delhi, the plant has 25, 50, 100, and 150 mm pipelines of about 200 m each with accessories and instrumentation. The plant is expected to serve as an important facility in the country for generating engineering data on slurry transport of coal and other minerals. Dr G.S. Sidhu, Director General, Scientific & Industrial Research, inaugurated the plant.

* * *

Formed coke undergoes successful industrial trials

Following successful trials of low-phosphorus formed coke, prepared at the pilot plant of Central Fuel Research Institute (CFRI), Dhanbad, in the low-shaft blast furnace of Kalinga Iron Works (KIW), Barbil (Orissa), a tripartite meeting between CFRI, KIW and Steel Authority of India Ltd (R&D) has recommended the setting up of a 500 tonnes per day formed coke plant at KIW on the basis of CFRI process for the production of high-valued pig iron. This is to be used in spun-pipe production and in ferro-alloy industries.

The trials had shown that up to 75% replacement of conventional coke by formed coke did not have any adverse effect on the furnace operation. Also, the phosphorus content of the metal was 0.14% when formed coke was used versus 0.22% observed with normal blast-furnace coke.

* * *

Fluidized-bed gasification unit at CFRI

The Central Fuel Research Institute, Dhanbad, has designed, fabricated and commissioned a 16 kg/hr, two-stage fluidized-bed experimental gasifier unit with a view to using slack coal with high ash content for producing gaseous fuel. The gaseous fuel could substitute petroleum-based fuels for heating in industries. Tests conducted with air and steam as gasifying media led to the production of gas with a calorific value of about 1300 kcal/m^3. □

Amaryllis blooming time delayed

The National Botanical Research Institute, Lucknow, has developed a simple technique for delaying the blooming of amaryllis till June instead of in March-April (in Lucknow).

The technique consists in removing the bulbs from the ground in December and storing them at room temperature till mid-May, when they are planted in soil. The plants coming out of these bulbs bloom the very next month. The blooms have almost the normal colour and size, with 100% blooming.

* * *

Modified extraction of oxalic acid

The National Botanical Research Institute, Lucknow, has developed a modified method for the extraction of oxalic acid, as a result of which it is possible to get better quality and higher yield of the acid than in the conventional method.

Oxalic acid is prepared industrially from plant sources by heating the raw material for 1 hr in 20% sulphuric acid at 100 C. In the improved method, the concentration of sulphuric acid used is 7% and instead of direct heating, steam-heating is resorted to, the advantages being that there is no disintegration and burning of oxalic acid as in the conventional method. □

Canning of green pepper

NRDC AWARDWINNING PROCESS

The announcement of National Research Development Corporation of India's 'Independence Day Award' for the team which has developed a process for canning tender green pepper (*Piper nigrum*) has been made [*CN*, 33 (1983), 129]. The team consists of Dr J.S. Pruthi (formerly at CFTRI experimental station at Ludhiana and since retired*), Shri A.V. Bhat, Shri A. George Varkey, Smt. Sathyavati K. Kutty, and Shri A. Gopalakrishnan.

*Present address: General Manager, M.S. Kold-Hold Industries (P) Ltd, New Delhi.

The team of awardwinners who have developed the process for canning tender green pepper (from left): Dr J.S. Pruthi, Shri A.V. Bhat, Smt. Sathyavati K. Kutty, and Shri A. Gopalakrishnan. (Photograph of Shri A. George Varkey could not be procured as he is away in UK on a British Council assignment.)

The Process

Although canned green pepper was already in the world market in a limited way, the product was not acceptable. Some of the problems faced by the industry were (i) discolouration of the covering liquid, (ii) rupturing of the berries, (iii) gelation, and (iv) sedimentation. Systematic work on canning of green pepper was started in 1973 at Central Food Technological Research Institute's experimental station at Trichur, the station becoming later part of Regional Research Laboratory, Trivandrum. A detailed investigation of the physico-chemical characteristics of pepper at different maturity stages was undertaken and the optimum maturity stage for canning was determined. The conditions for canning of green pepper were standardized and the process was scaled up. All the problems experienced earlier have been solved. The new process allows canning of green pepper that is export-worthy. Some of the findings of the study were presented at the International Seminar on Pepper (Cochin, 1976). The process know-how has already been commercially utilized by seven industries. The technology of canning green pepper is available from: The Director, Regional Research Laboratory, Trivandrum 695019.

Black pepper is an important foreign exchange earning commodity. Exporting pepper in the canned green form instead of the conventionally dried black pepper could lead to an earning of 200 to 250% more. And green pepper is preferred to black pepper by importing countries, India's export of green pepper amounting to about 340 tonnes (worth about Rs 40 lakh) in 1981-82. □

Silicon-nitrogen reaction for manufacture of reaction-bonded silicon nitride

Nitridation of commercial silicon is the basis for manufacture of silicon nitride, a useful high-temperature material with excellent thermal shock resistance and other high-temperature mechanical properties. This is a candidate material for land-based and vehicular turbine parts. It could be used extensively in nonferrous metallurgy and electronics devices.

The reaction of nitrogen gas with solid silicon powder has been studied by Shri Sampad Kumar Biswas, a researcher at Central Glass & Ceramic Research Institute (CGCRI), Calcutta. Nitridation of commercial silicon powder, studied thermogravimetrically, has been found to follow the parabolic kinetics. When mixed with 1 wt% alkaline-earth fluorides, silicon powder has been found to nitride in a linear rate process. A mechanism involving nitridation of the fresh silicon surface and silicon difluoride formed by the reaction of metal fluoride vapours with the native silica layers on the surface of silicon particles has been proposed.

Very thin layers of Si_3N_4 films suitable for electronics device technology have been deposited by direct nitridation on the surface of silicon single crystal chips cut to expose the 111 surface. IR spectroscopy shows the presence of Si_3N_4, whereas refractive index measurements show that the films are contaminated with oxygen.

Growth rates of β-Si_3N_4 by the reaction of nitrogen gas with molten high-purity silicon have been found from metallographic experiments. Addition of metals up to 1 wt% to the silicon does not alter the parabolic kinetics obtained in the case of high-purity silicon. However, the activation energy could be lowered by adding 1 wt% Ti and Hf. A mechanism involving diffusion process of nitrogen through the molten silicon has been proposed. The diffusion coefficients of nitrogen through molten silicon in the presence of the metal additives have been determined.

The data from this study have helped prepare reaction-bonded silicon nitride at a temperature as low as 1250°C as against the usual 1350°C. The findings would also help eliminate the residual unconverted tiny silicon grains usually present in the final product.

Shri Biswas, who carried out the work under the guidance of Dr Joydeb Mukerji of CGCRI, was awarded Ph.D. (1983) by Calcutta University. □

Sugar-beet growing for benefaction of alkali soils

Studies made on five sugar-beet varieties, by a researcher Shri V.K. Garg, at National Botanical Research Institute (NBRI), Lucknow, have shown that beet roots were able to absorb Na^+ and K^+ from surface (0-15 cm) as also subsurface (15-30 cm) layers, though mostly from the former layer.

The sugar-beet varieties used were Ramonskaya-06, Dobrovica-C, M. Marinapoly, M. Magnapoly, and Barres. The crop was grown in the field at three varying levels of ESP (exchangeable sodium percentage), viz.

low (21), medium (32), and high (45), for three consecutive years. Successive cropping of sugar-beet resulted in a net decrease of exchangeable Na^+, ranging from 0.80 to 2.11 m.e. in the exchange complex. Consequently, soil *p*H showed a net decrease, ranging from 0.20 to 0.70 in the surface layer, depending upon the extent of alkalinity. Correspondingly, there was an increase in exchangeable Ca^{2+}, but the exchangeable Mg^{2+} varied inconsistently in the surface layer. Besides the removal of sodium there was an increase in the organic carbon content of the soil. M. Marinapoly was found to be most effective for benefaction of alkali soils followed by Dobrovica-C, Ramonskaya-06, and M. Magnapoly at all the ESP levels. Barres, a fodder beet variety, was found to be slightly better than M. Magnapoly. Beet roots, owing to their high CEC (cation exchange capacity)—40-63.33 m.e.—were able to increase the removal of Na^+ from the soil.

M. Marinapoly also produced maximum biomass (63 cwt/ha) and root mass (*c.* 125 cwt ha), in addition to being the most suitable of the five varieties. It also has a higher sugar yield potential (13.14 cwt ha) even at a high ESP level. The study further revealed that the sugar-beet can be successfully grown on sodic soils with an ESP level of up to 32. M. Marinapoly also afforded the maximum removal of Na^+ (55.67 and 33.85 kg ha) by its top and roots respectively. Similar results were obtained when the soil was treated with pyrites. To obtain the maximum benefaction of alkali soils, the crop may be harvested in the month of April when translocation of Na^+ in the top as also in the roots reaches the maximum.

Shri Garg, who worked under the guidance of Dr S.D. Khanduja of NBRI, was awarded Ph.D. degree by Kanpur University for his thesis based on the study. □

President visits CFTRI

The President of India, Shri Zail Singh, visited Central Food Technological Research Institute (CFTRI), Mysore, on 3 September. Dr B.L. Amla, Director, apprised him of the activities and technological developments of the institute. The President was taken round an exhibition of the laboratory's products, specially arranged on the occasion. He also saw the pilot plants for upscaling the technologies developed by the institute.

The President of India, Shri Zail Singh, showing keen interest in the CFTRI products displayed at an exhibition specially got up on the occasion.

Impressed by its work, Shri Zail Singh said: "The institute is doing a great service to the nation through its projects to develop new processes for our food industry. With the increase in the production of a large variety of perishable commodities, evolution of preservation technology has assumed great importance. Therefore the services offered by the institute are very valuable." The President also congratulated the scientists on their performance. □

PROGRESS REPORTS

NPL Annual Report: 1981-82

The National Physical Laboratory (NPL), New Delhi, has brought out recently its annual report for 1981-82, according to which its major activities centred on: updating primary standards of time, length, electromotive force and electrical capacitance; development of a prototype system for the detection of hot journal (axle) boxes of trains; production of alkali halide crystal of a high degree of perfection; participation in the International Middle Atmosphere Programme; designing of a solar thermal system for industrial process-heating; and development of low-cost probes for cryosurgery. Three processes relating to (i) colour coatings of sun glasses, (ii) silver-impregnated graphite contacts for relays, and (iii) construction technique for ceramic enclosed sensors for industrial platinum resistance thermometers were released for commercialization. The following processes released earlier went into the production: constant-stress viscometer, midget electrodes, and film-thickness monitor. Four patents were filed, one was accepted, and three were sealed.

A calculable capacitor was set up with the assistance of NPL, Teddington, and

by using this, the unit of resistance, ohm, could be realized with an uncertainty of 5 parts in 10^7—comparable to the accuracy achieved in major laboratories the world over. Time transfer and time dissemination experiments via the Indian experimental satellite APPLE were started in collaboration with Indian Space Research Organisation. Under the Asia/Pacific Metrology Programme, NPL participated in the intercomparison of travelling standards of two, 1-kg masses, four standard lamps, transvolt, electronic voltage standard, and two capacitance microphones and pistonphone.

A hot axle box detection system was developed and field-tested near Sahibabad railway station. Based on the feedback obtained from the trials, work was started on the fabrication of a new dual-channel prototype of the system. A photoacoustic spectrophotometer for single-beam and double-beam modes was designed and developed for studying the optical and thermal properties of materials. The absolute measurement of radiation was improved upon by developing an electrically balanced pyroelectric radiometer in place of the electrically calibrated pyroelectric radiometer. Alkali halide crystals of a high degree of perfection—not so far reported in the literature—were grown from melt by Czochralski technique on the two crystal pullers developed earlier by the laboratory. A new non-destructive method was developed for quick evaluation of gross perfection of single crystals.

Work on carbon products was pursued by using pitch coke and high-sulphur coke as substitutes for petroleum coke. The oxidation and carbonization techniques involved in the continuous process for producing carbon fibres were improved. Large-size special-grade professional Ni-Zn ferrite torroids were developed for the Variable Energy Cyclotron project of Bhabha Atomic Research Centre. A sonic weighing balance was developed which could be used by the blind. Also, a method for ultrasonic power measurement and an ultrasonic system for measurement of liquid flow rate were developed. The first in a series of large-scale trials of Cu-activated monochrome TV phosphors produced at NPL were conducted at Bharat Electronics Ltd, Bangalore, on the basis of the sample approved earlier. This has provided the basis for setting out the specifications of the indigenous phosphors.

The Radio Science Division of NPL is a major participant in the International Middle Atmosphere Programme (MAP): 1982-85. Under MAP, a balloon experiment for the measurement of stratospheric positive and negative ion densities was carried out from Hyderabad on 23 March 1982. Ion concentrations were measured up to 33 km. At the request of ISRO, short-term forecasts on solar and magnetic conditions on twice-a-week basis were provided for launching the Rohini satellite. A dual hot-wire temperature probe for measurement of atmospheric temperature in the region 60-90 km was developed in collaboration with University of Wales. Work was also carried out on: (i) estimation of the erythemal dose over the Indian subcontinent by using UV-B photometers; (ii) feasibility of cyclone centre monitoring through observation of atmospheric gravity waves by HF doppler; (iii) anomalous tropospheric propagation using Posts & Telegraphs line-of-sight links between Madras and Tirupati; (iv) short-term solar and magnetic activity forecasts, and (v) evaluation of the Indian high-frequency link performance and forecasting of aviation hazards with the forward scattering sodar system. A major activity was concerned with the development of atmospheric and ionospheric reference models over the Indian subcontinent.

In the high-pressure technology, work on the compaction of c-BN to make tool tips was started.

A solar thermal system for industrial process heating was designed. The effect of grain size on diffusion length of minority carriers and spectral response of polycrystalline silicon solar cells was studied. A novel field-assisted chemiplating process of junction formation was developed to enhance the efficiency and life of thin-film CdS: Cu_2S solar cells. Also developed was a new type of positive-mode colour-display device.

A new cryoprobe was developed for treatment of tumours in the ENT area. Field tests on the device at a general hospital in Delhi were satisfactory.

One hundred and twenty-nine papers, including 13 scientific/technical reports, were published; besides, 120 papers were presented at symposia. □

Science Policy and Planning and Social Progress in GDR

This is the title of a publication brought out recently by National Institute of Science, Technology and Development Studies (NISTADS), New Delhi. The publication comprises a series of three lectures delivered at NISTADS by Dr Dietrich Wahl of the Institute for the Theory, History and Organisation of Science, Berlin, of GDR's Academy of Sciences.

The lectures bring out the interrelationship of the various facets of S&T policies and planning with social progress in a socialist country. The subject matter should interest not only policy-makers in socialist countries but elsewhere also.

Copies available from: The Director, NISTADS, Hillside Road, New Delhi 110012. □

Saccharin: Toxicology Data Profile

This is the latest in the series of data profiles on chemicals and drugs compiled by Industrial Toxicology Research Centre, Lucknow. It gives a brief account of the toxicity studies carried out the world over on the sweetener saccharin along with general information on its production, manuf-

acturers (in India), impurities, etc. The toxicity studies relate to carcinogenicity, mutagenicity, reproduction, embryotoxicity, teratogenicity, and immunotoxicology. The compilation points out that the use of saccharin in cheap drinks and candies is guided not by the manufacturers' desire to reduce the risk of obesity to the consumers but by the economics.

Because of its harmful effects on foetus and children, the compilation warns, women and children ought to avoid its use. Pregnant women as well as lactating women should avoid saccharin unless their medical condition warrants its use.

The publication (211 references consulted and 490 other references) also gives recommendations of committees on the safety of saccharin.

Copies of the publication (compilers: R.R. Khan and Gomathy Iyer) obtainable from: The Director, Industrial Toxicology Research Centre, Lucknow 226001. □

DEPUTATION BRIEFS

Dr P.N. Viswanathan

Dr P.N. Viswanathan of Industrial Toxicology Research Centre (ITRC), Lucknow, participated, on invitation from Heriot Watt University, as a faculty member in the second international course on Environmental Toxicology, held at Edinburgh from 15 to 19 August. Dr Viswanathan's report:

The course was organized by Institute of Offshore Engineering and Department of Brewing and Biological Sciences of Heriot Watt University in association with WHO's Regional Office for Europe (Copenhagen) under the auspices of the International Programme for Chemical Safety. The other faculty members were drawn from various institutions in UK, Pan American Health Organization (Washington), US Environmental Protection Agency, and University College, Dublin. The trainees were drawn from 40 countries of Latin America, Africa, Europe, and Asia.

The lectures covered concepts in ecotoxicology, mutagenicity testing for pollutants and genotoxicity, environmental carcinogenesis, predictive toxicological evaluation, occupational health problems, biotransformation of xenobiotics, microbial degradation of pollutants, and model ecosystem for predicting ecological impact. Environmental monitoring, effects of pollutants on flora and fauna, biological monitoring of ecotoxicological case studies and environmental quality and occupational health surveillance were also covered.

In his lecture, delivered on invitation, on Environmental Toxicology in India, the ITRC scientist explained the biochemical approach to study the ecological effects of toxic environmental pollutants, the experimental studies being carried out at ITRC on detergent effluents on aquatic flora and fauna, and the studies made on ecological quality surveillance. Presenting the state-of-art document on the problems of environmental pollution in India, Dr Viswanathan dealt with the measures being taken to solve them. □

PATENTS INFORMATION

Indian Pat. 295/Del./83 (filed)

Interlocking ultrasonic test jig device

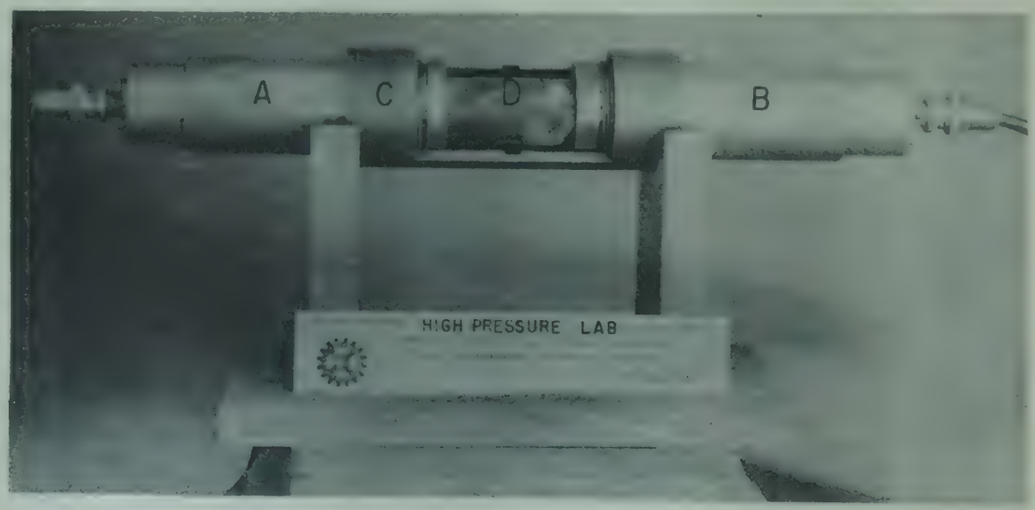
Y.V. RAMANA

National Geophysical Research Institute, Hyderabad 500007

The patent covers an interlocking ultrasonic test jig device for determining the wave velocity and amplitude in rock core specimens and other solids in their ambient state.

The jig comprises a transmitting transducer(A), a receiving transducer(B), and an interlocking collar(C) that holds the test sample(D) and the transducers A and B together. The jig ensures: (i) alignment of two ultrasonic transducers (for pulse transmission configuration); (ii) uniform and identical acoustic contact at the sample faces; (iii) adequate nominal stress conditions on the sample; and (iv) check against parallelism of the sample faces. These conditions are essential for the rapid and reliable measurements, which in turn are necessary for the statistical evaluation of acoustic characteristics of rocks required in geological and geophysical investigations and interpretation of laboratory data in comparison with field results.

The jig has also been found to be equally applicable for studying unconsolidated offshore sediments, and semi-solids like gels, and biological media like muscles. □



Interlocking ultrasonic test jig developed at NGRI for determining the wave velocity and amplitude in rock core specimens and other solids in ambient state. It has also found application for studying unconsolidated offshore sediments, semi-solids like gels, and biological media like muscles.

C.F.T.R.I., MYSORE

Indian Pat. 318 Del./83 (filed)
Improved process for extraction of vanadium from vanadium-bearing materials/ores
P.K. JENA, D.N. DEY, A.K. JOUHARI, A.K. TRIPATHY, S.C. RAY, AND G.N. BANERJEE
Regional Research Laboratory
Bhubaneswar 751013

The process covered by the patent involves roasting of titaniferous vanadium-bearing magnetites or any other vanadium-bearing material with more than 0.1% vanadium. Roasting is carried out in a specially designed system which has no moving parts and does not use furnace oil. Sodium carbonate, ground ore and a suitable fuel, taken in proper proportion, are thoroughly mixed in a mixer and charged into the roasting device, the roasting time being only 15-20 min. The roasted mass is leached with water to obtain sodium vanadate, which is used for producing vanadium pentoxide by methods in vogue. Vanadium can be recovered to an extent of more than 80%.

* * *

Indian Pat. 164/Del./83 (filed)
*Improved thin film thickness measuring device**
D.K. KAUSHIK, S.K. CHATTOPADHYAYA, AND N. NATH
Physics Department, Kurukshetra University
Kurukshetra 132 119

In this set-up, a single quartz crystal of 5 MHz frequency and 20 mm × 20 mm size, with two pairs of gold electrodes deposited on it and separated by a suitable distance, was used to measure the rate of growth and the thickness of thin films during deposition. The two pairs of electrodes behave like two independent quartz crystals. The advantage in using the single quartz crystal is that the frequency shift due to environmental influences (like temperature and pressure) is eliminated to a greater extent. The thin film whose thickness is to be measured was deposited on one side of one electrode pair (main electrode pair) while the other pair (reference electrode pair) was kept covered from deposition. The resonance frequencies of the two-electrode system were then processed in a conventional manner and the best frequency was measured by a digital frequency meter. To measure the rate of growth of the film deposited, the latter's output was passed on to a frequency-to-voltage converter, and the resulting voltage was plotted on an X-Y recorder.

* * *

Indian Pat. 112/Del./83 (filed)
Improved process for preparation of white-emitting phosphor materials
P.K. GHOSH, H.P. NARANG, AND R.K. KAPOOR
National Physical Laboratory
New Delhi 110012

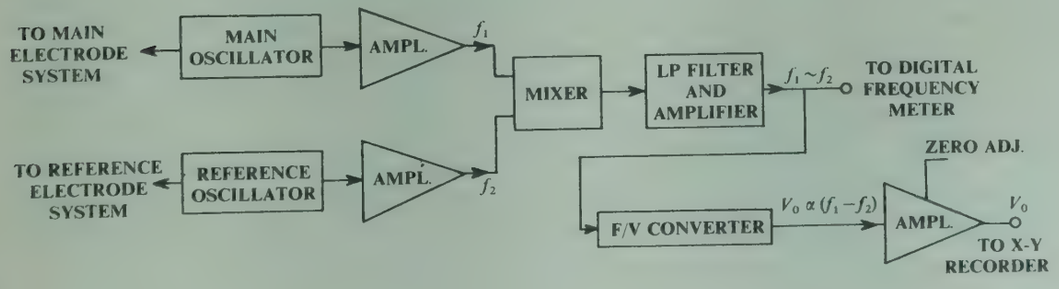
The process covered by the patent is an improvement over the known processes. It involves the use of raw materials of specified purities to yield phosphors with higher brightness (light output) than those prepared by known processes. These are acceptable for use in monochrome TV picture tubes.

In the process, zinc oxide, ammonia solution and hydrochloric acid of desired purity are used to prepare pure (luminescent-grade) zinc sulphide powder. Cadmium sulphide powder is prepared by using cadmium nitrate of desired purity. Demineralized water of desired conductivity is used throughout the process and experimental conditions like concentration of activators and co-activators, firing procedure, temperature, atmosphere and proportions of zinc sulphide and cadmium sulphide for yellow-emitting phosphors separately.

The white-emitting phosphor is a mixture of blue- and yellow-emitting phosphors in desired proportion.

The process is the result of work done on a laboratory-scale in early seventies. The process has undergone pilot-plant trials during which it has been further improved. (A separate patent relating to the improvements in the laboratory-developed process is being filed.) The materials produced in the pilot plant have been successfully and reproducibly tested by Bharat Electronics Ltd, Bangalore. □

*The research leading to the patented device was carried out extramurally, that is, supported by CSIR outside of its constituents.



Block diagram of the thin-film thickness measuring device

PERSONNEL NEWS

Dr B.R. Sant

Dr B.R. Sant of Regional Research Laboratory, Bhubaneswar, has assumed charge as Project Officer of CSIR Polytechnology Transfer Centre, Hyderabad (2 Sep. 1983).

Appointments/Promotions

At Publications & Information Directorate, New Delhi, Shri S.K. Das Gupta (since retired) and Shri M.V. Pant have been promoted, consequent on assessment, as Art Officers EI (1 Jan. 1983).

* * *

At Central Drug Research Institute, Lucknow, the following have been promoted on assessment (with effect from dates given in parenthesis).

As Scientist EII [*Group IV*(4)]

Dr K. Kar and Dr O.P. Srivastava (1 Feb. 1981); Dr R.C. Srimal and Dr S.K. Chatterjee (1 Aug. 1981); Dr K.C. Saxena (1 Dec. 1982); Dr G.N.

Srivastava (1 Feb. 1983); Dr S.K. Roy (30 June 1982); Dr Chanan Singh (22 July 1982); and Dr D.S. Bhakuni (29 July 1982).

As Scientists EI [*Group IV*(3)]

Shri K.V. Satyanarayana, Dr S.R. Das, Dr P.R. Dua, Dr J.N.S. Yadav, Dr K.B. Mathur, Dr J.S. Tandon, Dr A.C. Shipstone, Dr J.C. Katiyar, Dr R.K. Chatterjee, Dr Harish Chandra, Dr O.N. Tripathi, Dr R.C. Bharadwaj, Dr N.K. Kapoor, Dr A.P. Bhaduri, Dr G.K. Patnaik, and Dr B.S. Setty (all from 1 Feb. 1981); Dr C.M. Singh and Dr P.K. Saxena (both from 1 Feb. 1982); Dr J.R. Kidwai (27 Aug. 1981); Dr B.S. Srivastava (19 Nov. 1981); Dr M.M. Gupta (11 March 1982); Dr Aboo Shoeb and Dr M.K. Sahib (1 Feb. 1982); Dr Vinod Bihari (15 Oct. 1982); and Dr D.K. Kulshreshtha (7 Dec. 1982)

As Scientist C [*Group IV*(2)]

Dr B. Malviya and Dr V.K. Srivastava (1 Feb. 1981) (MOH scheme); Dr Satyavrat (20 Dec. 1981); Dr Susheel Durani (13 July 1982); and Dr (Smt.) R.K. Seth (19 Dec. 1982)

As Technical Officer [*Group III*(3)]

Dr (Smt.) Gitika Bhatia (1 Feb. 1981)

As Scientist C [*erstwhile bye-law* 71(*b*)]

Dr (Smt.) J. Chatterjee (1 June 1981); Shri P.Y. Guru (7 April 1982); Dr P. Sailaba (2 May 1982); and Dr Chandan Singh (1 Sept. 1982)

*As Scientist C*1 [*erstwhile bye-law* 71(*b*)]

Shri J.P. Upadhyay (14 Dec. 1982)

*As Scientist B*1 [*erstwhile bye-law* 71(*b*)]

Shri S.A. Kidwai (1 July 1982)

As Senior Librarian [*erstwhile bye-law* 71(*b*)]

Smt. B. Banerjee (1 June 1981) and Kum. Roma Banerjee (24 July 1980)

As Scientist B [*Group IV*(1) (*faster one-track promotion*)]

Shri B.S. Aswal (8 May 1981)

As Technical Officer [*Group III*(3) (*faster one-track promotion*)]

Shri C.K.M. Tripathi and Shri Ramesh Chandra (both from 1 Feb. 1981); Shri Ved Prakash (2 Nov. 1981); Smt. S.K. Bajpai (1 Dec. 1981); and Shri A.K. Dwivedi (2 Nov. 1981).

As Scientist B [*Group IV*(1) (*new recruitment and assessment scheme*)]

Shri V.K. Sharma and Dr (Kum.) Manju Seth (both from 1 Feb. 1982), Dr (Kum.) Banani Sur, Dr (Smt.) Madhu Khanna, Shri L.M. Tripathi, Dr A.K. Goel, and Dr Rajendra Prasad (all from 1 Feb. 1983); and Dr (Smt.) Sheela Tandon (1 Feb. 1983, NICDAP).

Honours & Awards

YOUNG SCIENTISTS AWARD TO DR A.K. SAXENA OF CDRI

Dr Anil Kumar Saxena of the Medicinal Chemistry Division of Central Drug Research Institute (CDRI), Lucknow, has been awarded the Young Scientists Award for 1983 of Indian National Science Academy. The award is in recognition of his contributions to

design synthesis and quantitative structure-activity relationship studies (QSAR) of compounds acting on the cardiovascular and cental nervous systems.

Dr Saxena (born 17 Dec. 1951) has had an excellent academic career and obtained his Ph.D. in 1973. A recipient of Alexander von Humboldt Fellowship (1977-78), he has to his credit about 30 research papers and 15 patents.

Based on the concept of 'freezing' the most favoured conformation of known active compounds by incorporating it in a rigid framework, the awardwinner has synthesized compounds belonging to a variety of heterocyclic systems. One of these compounds, 4′-fluoro-4-(3, 4, 6, 7, 12, 12a-hexahydropyrazino [1′ 2′:1 6] pyrido [3,4-*b*]indole-2(1*H*)-yl)butyrophenone—Centbutindole—showed marked neuroleptic activity and is now under clinical trial. Besides showing that its *l*-isomer having S-absolute stereochemistry is most active, the CDRI researcher has demonstrated from studies on receptor binding *in vitro* and QSAR that the pyrazinopyridoindole part of the compound occupies the dopamine receptor site stereospecifically, while the butyrophenone chain occupies the accessory binding sites.

In QSAR studies, Dr Saxena has mainly used the free energy related approach. He has established that the hypotensive activity of hexahydropyrazinoquinolines is mainly due to their lipophilicity and that their transport to the active site is the rate-determining step. In the case of 1-(3-amino-4-pyridyl)-4-arylpiperazines which possess anticonvulsant activity, both hydrophobicity and electronic factors are important.

In a QSAR study of octahydropyrazinopyridoindoles using a combined model of physico-chemical and Free-Wilson analysis, he has observed that their neuroleptic activity can be best correlated with their lipophilicity and the distance between the aromatic ring of the side-chain and N-2 and that their H_1- receptor antagonistic activity is influenced by the hydrophobicity of the side-chain and the bulk of the substituent at the othro position of the β-aroylamineothyl side chain.

Dr Saxena has also developed new methods of synthesis of certain heterocyclics. These include a method of N-alkylation of indoles using lactam acetals and a synthesis of disubstituted 3-aryl-4(3*H*)pyrimidones using acetylenic esters. His studies have led to the elucidation of the mechanism of addition of electrophiles and dipolarophiles to 3-amino-9*H*-pyrido[3,4-*b*]indoles and of the effect of the indole nitrogen on the epimerization of *cis*- and *trans*-1-phenyl-1,2,3,4-tetrahydro-9*H*-pyrido[3,4-*b*]indole-3-carboxylic acids. □

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CSIR NEWS

A SEMI-MONTHLY HOUSE BULLETIN OF CSIR

VOL 33 NO 21 15 NOVEMBER 1983

Seminar on Science in the Media

A two-day seminar on Science in the Media, organized by Council of Scientific & Industrial Research, brought together scientists and media representatives for developing better understanding and rapport between the two. The seminar also addressed the promotion of scientific temper among educated laymen in the first instance and vast multitudes of people in the long run. Held at CSIR Science Centre, New Delhi, on 27-28 September the seminar spanned three technical sessions and an in-house session which overviewed the discussions and made appropriate suggestions and recommendations to the CSIR authorities.

Pleading for more frequent get-togethers of this nature, CSIR's Vice President Prof. Nurul Hasan*, who inaugurated the seminar, stressed the importance of making scientists aware of the wider implications of their work. Prof. Hasan added that people should be familiarized with important scientific developments, specially in the frontier

*now India's Ambassador to USSR

Dr Amarjit Singh, then acting as Director General of CSIR, and chairman of seminar, speaking at the inaugural session of the seminar on Science in the Media. Seated on the dais (from left) are: Shri P.N. Haksar, former Vice President of CSIR, Prof. Nurul Hasan, then Vice President of CSIR, and Shri Shivraj V. Patil, Union Minister for Science and Technology.

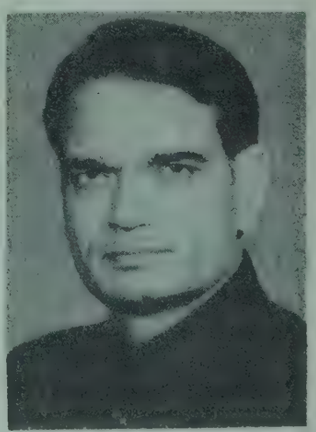
Shri Shivraj Patil takes over as CSIR Vice President

Shri Shivraj V. Patil, Minister of State for Science and Technology, Atomic Energy, Electronics, Space, and Ocean Development, has taken over additionally as Vice President of CSIR effective 20 October 1983.

The former Vice President of CSIR, Prof. S. Nurul Hasan, relinquished charge of his office consequent on his appointment as Ambassador to USSR.

Shri Patil

Born 12 October 1935 at Chakur village (Maharashtra), Shri Patil was educated at Osmania University, Hyderabad, and Bombay University, Bombay. With the Union Council of Ministers since 1980, Shri Patil has



held positions as Minister of State for Defence, and Minister of State for Commerce (independent charge).

Widely travelled and author of two books, Shri Patil has deep commitment to science and technology as a major instrument for the country's socio-economic development. □

areas of science, so that they could apply their minds to the possibilities opened up by recent advances in, for example, agriculture and industry. For better dissemination of scientific information to the public, which was essential to the country's socio-economic progress, Prof. Hasan suggested that attention be paid to the training in science reporting.

Endorsing the need for more such seminars, the Minister for Science and Technology, Shri Shivraj V. Patil†, in his presidential address, described mediamen as masters of the world of words. Media and science together would prove to be a very powerful instrument for socio-economic changes, the minister added.

Recalling that the Scientific Policy Resolution was a part of Shri Jawaharlal Nehru's attempt to inculcate scientific temper in the lives of our people, Shri Patil said that the recent Technology Policy Statement issued by the Prime Minister underlined the importance of the development of technology for masses and for mass-production of appropriate technology as well as sophisticated technology and the need to develop both. When technology had to be imported, attempts should always be made to absorb, assimilate and improve upon it. However, he made it clear that the emphasis was on the development of indigenous technology.

Delivering the keynote address in the session on promoting scientific temper, Shri P.N. Haksar, former Vice President of CSIR, sounded a note of warning that society, enmeshed as it was in problems to solve which it was unable to use reason, was in a dangerous state. He underscored the role of the scientist in establishing the rule of reason as opposed to religious dogmas. Dogmas, he said, were widely used by vested interests on minds which were troubled. Citing the example of Germany, he said that its civilized legacy could not stop it from following Hitler's path to self-destruction. There was a need in this country, therefore, to wage a relentless struggle to establish the rule of reason. He regretted that voices of unreason were being raised in the country. There was irrationality in text-books, in political life, and in socio-economic thinking, which had to be replaced with a spirit of enquiry and logical thinking. He called upon people to beware the men who appear as absolute possessors of the truth.

In his paper 'Science in the Media', Shri S.C. Pandya of the Press Information Bureau stated that a new role had been thrust upon scientists because of the public trust accompanying the huge investment of public money and the size and cost of scientific undertakings. Scientists should therefore not forget that they were obliged to report back to the society which sustained their activity. They should be more willing to talk to an enterprising reporter without scoffing at his ignorance, he added. Shri Pandya suggested that: (i) Newspapers with a circulation of 50,000 or more must have a science set-up comprising reporters, copy-writers and, if possible, a science editor; (ii) Science writers get their writeups published in newspapers on their own and irrespective of payments made by newspapers and that appropriate government agencies at the centre and in the states should make additional payments commensurate with the standing of the newspaper and content of the story; and (iii) CSIR or any other science organization should institute awards for three best science stories published in any language and in any newspaper.

An interesting science news survey carried out by the CSIR's Public Relations Unit was presented at the session.

During discussion on 'New Horizons in Information Technology', the main speaker, Dr N. Vijayaditya of Electronics Commission, brought into focus the tremendous growth in the computer industry. He said that such a growth had been mainly due to the advances in microelectronics. The barrier to further computerization of the complex information system, according to the speaker, was the application development cost.

Shri V.N. Chhabra of *The Statesman*, who spoke on the print media, said that for about 500 years the technology of the main printing and finishing processes had remained unchanged. But now the picture was fast changing as a result of satellite communication. Pointing out the simultaneous printing of the *International Herald Tribune* in five world capitals, he said that the newspaper had, in one week-end, taken a leap from the 19th century to the 1990s. The Indian newspapers had also embarked on a major modernizing programme. This had been made possible by the liberal government policy for the import of new technology equipment as well as indigenous equipment. The 'Rajasthan Patrika' had used entirely indigenous equipment for its simultaneous printing from three centres.

During the session devoted to the role of science in socio-economic changes, Shri D.R. Mankekar, a former editor, said that the media could become a catalyst for accelerating changes.

Delivering the keynote address, Prof. A. Rahman, Director of National Institute of Science, Technology and Development Studies, New Delhi, underscored the necessity to have a rational decision-making process in a society which was based on superstition and which ignored science.

Dr (Smt.) G.V. Satyawati, of Indian Council of Medical Research, said that in promoting health measures the community had to be taken into confidence.

Recommendations

Some of the more important suggestions and recommendations:

Recognizing that science reporting has acquired the dimension of a major art, the seminar felt that if a cadre of trained science journalists could be built

†now, also Vice President of CSIR

up it would go a long way in providing greater science news coverage, especially of CSIR, in the media.

Also recognizing that there are no institutions imparting specialized training in science journalism, the seminar recommended that CSIR itself may take initiative to stimulate the introduction of science journalism courses. This could be done at recognized institutions like Indian Institute of Mass Communication and universities already running courses in journalism. CSIR should institute fellowships in these institutions and or newspaper organizations and sanction appropriate grants. The Council may hold appropriate workshops, bringing together science editors of newspapers and journals, and its own information scientists. The workshops may cover different aspects of science journalism, such as exhibitions, science reports, and projects in collaboration with appropriate specialized institutions. To create awareness among the concerned institutions of the need to introduce science journalism courses, CSIR could sponsor science-related projects in such institutions and universities.

The dual purpose of creation of scientific temper and popularization of CSIR's activities could also be achieved, the seminar felt, by sponsoring science quiz programmes in electronic media in which questions pertaining to science in general and CSIR in particular could be asked and attractive prizes in the shape of CSIR products like colour TV, leather goods, food products, and other consumer goods could be offered. Such a measure would generate more interest in science and CSIR on the one hand and highlight the achievements of this research council on the other.

The seminar called for giving adequate emphasis to public relations work. One of the measures suggested was a separate and adequate budget to be earmarked for the PR set-ups, both at the Headquarters and in laboratories. The seminar was appreciative of the direction given in this regard by the Prime Minister who has called for aggresive salesmanship' on the part of CSIR.

Some of the other recommendations were concerned with intra-CSIR mechanisms for projecting the image of the Council. □

Microwave Power Tubes and their Applications Symposium at CEERI

At a symposium held at Central Electronics Engineering Research Institute (CEERI), Pilani, 19 research and review papers presented, covered R&D work on microwave tubes and subsystems incorporating these devices as well as the requirements of different types of microwave tubes by various system-designer groups and user agencies.

Spread over three days, 21 to 23 September, the symposium spanned three technical sessions, a panel discussion session, and a valedictory session. It was inaugurated by Shri Shivraj V. Patil, Union Minister of State for Science and Technology*, on 21 September, which is also this institute's foundation-day anniversary. The function was presided over by Shri S.C. Mathur, Chief Minister of Rajasthan.

Some 30 participants from university departments, research organizations, and public sector industries, besides scientists from CEERI, attended the symposium.

Air Chief Marshal O.P. Mehra, Governor of Rajasthan, addressing the concluding session, said that for technologies like those of microwave power tubes involving sensitive defence applications, efforts along original lines assume great significance. We cannot content ourselves with merely trying to rediscover the known technology in such fields, but have to put in our best efforts to boost work in novel and untrodden directions, he continued. Underscoring the importance of self-reliance in defence R&D, the Governor said: "Whilst we may, to some extent, rely on foreign technology in relation to consumer goods, we cannot, without peril to our sovereignty, do so where national security is involved." □

*now Vice President of CSIR also

Shri Shivraj V. Patil, Union Minister of State for Science and Technology, being shown the microwave power tubes developed by CEERI, on the occasion of its foundation-day anniversary.

CECRI'S WORK ON BATTERIES: OPEN HOUSE DISCUSSIONS

An open house discussion on Primary and Secondary Batteries held at the Madras unit of Central Electrochemical Research Institute (CECRI) on 4 August identified six problems/areas which needed greater R&D efforts: (i) reduction in the cost and weight of batteries and increase in their output, (ii) standardization of containers and removal of leakage and short-circuiting problems, (iii) development of reverse-type batteries such as lithium, and missile batteries, (iv) development of instruments for evaluating the state of charge and capacity of batteries after storage for long periods, (v) increasing the shelf-life of dry cells, and (vi) creation of testing facilities for raw materials, especially for small-scale industries.

Among the CECRI developments presented at the meeting mention may be made of the porous carbon electrode for air-depolarized cells. These cells, which use zinc and porous carbon as electrodes and sodium hydroxide as electrolyte, find many applications, especially in railways where they are used in signalling and other equipment. The party to which the CECRI know-how for these cells was released was meeting the entire demand (about 1.2 lakh pieces per annum) of the Indian Railways. Also presented was the development of an improved version of zinc-air cell which could replace silver oxide-zinc secondary batteries. The know-how was ready for release.

For naval and meteorological equipment, which are used for monitoring the climatic conditions at temperatures as low as −80 C, CECRI had developed magnesium-cuprous chloride water-activated batteries with good shelf-life. The magnesium-silver chloride water-activated batteries possess a long shelf-life in unactivated state and are capable of being activated in less than 3 s to deliver the required current at a voltage of more than 1.3 V. These batteries find use in several naval applications. The silver oxide-zinc secondary batteries developed by the institute would make them less costly than the imported ones. Being capable of discharging over a wide range of temperature (−30 C to 60°C), they are especially useful for military applications and modern miniaturized electronic instruments.

Developments in the field of lead-acid batteries and nickel-cadmium batteries were also presented. The formation of a nonconducting material like sulphate in lead-acid batteries is avoided in nickel-cadmium batteries and these could be used safely at low temperatures.

The testing facilities offered by the institute were also mentioned at the open house.

Get-together on Corrosion Problems in Sugar Industry

At another research-industry meeting organized by CECRI at CSIR Complex, Madras, on 16 August, corrosion problems relating to sugar industry were discussed. While some remedial measures were suggested on the spot, it was decided that a series of articles covering each section of the sugar plant with regard to corrosion problems would be published in the *Corrosion Bulletin* of CECRI; case studies would also be covered. □

Biophysical studies of cholera phage $\varphi 2$

At Indian Institute of Chemical Biology (IICB), Calcutta, a researcher, Smt. Keya Chaudhuri, has characterized the physical, chemical and biological properties of cholera phage $\varphi 2$, belonging to Mukerjee's group II. The study is important from taxonomic and other points of view.

The purified cholera phage $\varphi 2$ was extensively characterized with regard to its kinetics of inactivation by heat, *p*H and different chemical agents, its thermodynamic properties at different temperatures, and its intracellular growth characteristics and plaque morphology under different environmental conditions.

Chemical analysis of purified phage $\varphi 2$ revealed the genetic material DNA of 1.62×10^{-16}g and protein of 1.32×10^{-16}g content per phage particle. Paper-chromatographic analysis of the hydrolysates of $\varphi 2$ DNA revealed the presence of four normal bases, viz. adenine, guanine, cytosine, and thymine. The $\varphi 2$ DNA was characterized as double-stranded. The base composition (G+C content) of $\varphi 2$ DNA was 42 mol%. The average molecular weight of $\varphi 2$ DNA was found to be 9.3×10^{7} daltons. Reciprocal plots of renaturation kinetics (hydroxyapatite chromatography and optical hypochromaticity methods) data showed that the phage genome did not have any repeated base sequences. The structural polypeptides of the phage $\varphi 2$ were analyzed by sodium dodecyl sulphate-polyacrylamide gel electrophoresis. Eight different polypeptides were identified.

The researcher has further characterized the biological properties of $\varphi 2$ DNA by infecting the $\varphi 2$ DNA to host spheroplasts as well as to host competent cells.

Smt. Chaudhuri, who carried out the study under the guidance of Dr M. Maiti of IICB, was awarded Ph.D. degree in physics (1983) by Jadavpur University for her thesis based on the study. □

PROGRESS REPORTS

CGCRI Annual Report: 1981-82

Thirty-nine applied research projects, including one sponsored project and one collaborative project, and five basic research projects were investigated by Central Glass & Ceramic Research Institute (CGCRI), Calcutta, during 1981-82. Four processes were released to industry for commercial production: high-alumina ceramics, cordierite-based saggars, ceramic porous cups for tensiometer, and lead-free white and coloured enamels for aluminium metal. The CGCRI processes which went into the production for the first time were:

high-temperature protective enamels for aeroengine components, and synthetic mullite and mullite corundum aggregates. This information is revealed by this laboratory's annual report for 1981-82, published recently. Investigations completed on a laboratory scale, related to: thermal toughening of ophthalmic lenses, glass-bonded mica for printed-circuit boards, lithium hydroxide monohydrate from lepidolite, talc-based ceramics for pottery, electrical and electronic industries, and high-strength plaster of Paris. The laboratory's pilot plant production of optical glass, worth Rs 1.17 million, was sold to user organizations.

Investigations on asbestos-wollastonite and mica-reinforced cement composites revealed that the samples prepared under pressure had superior properties and that the reinforcement with asbestos was better than that with mica or silica flour. Samples reinforced with crysolite asbestos were better than those reinforced with the indigenous amphibole variety. Exploratory trials showed that 50% replacement of asbestos by wollastonite could be effected without much deterioration in the physical properties of an asbestos-wollastonite cement composite.

A technique was developed for fabrication of fibreglass reinforced bitumen pipes by using the low-cost glass fibre developed by the laboratory.

Two varieties of plaster of Paris, i.e. α-plaster and β-plaster, with good, dry compressive strength (190 kg/cm^2 and 500 kg/cm^2 respectively) were developed by calcining Bikaner gypsum. Studies were also carried out to utilize Neycer waste plaster mould as a building material.

The effect of magnesium fluoride on the growth of silicon nitride was investigated and a thermodynamic interpretation of how the fluorides act as activator was suggested. The silicon nitride formation was shown to take place in vapour phase via SiF_2.

Zircon-based products like nozzles, used in continuous casting of steel and feeder expendables in glass industries, are largely imported. The laboratory investigated the optimization of the relevant parameters for developing products containing (i) 85-100% zircon, and (ii) 15-20% zircon with other minor additives like TiO_2, MgO, CaO, and Cr_2O_3. Some of the formulations gave promising results. To ascertain the feasibility of upscaling the production, a few samples of nozzles and bricks were prepared at the works of Indo-riv Refractories (P) Ltd, Dhanbad, and Kay Cee Ceramics (P) Ltd, Ranchi, by utilizing their infrastructural facilities; the products were being evaluated.

The two major advantages of phosphate-bonded monolithics are the ease of application and attainment of sufficient working strength at fairly low temperatures of curing, factors which result in the saving of fuel. Work was completed on the development of: aluminium-chromium-phosphate with the composition Al_2O_3-3 P_2O_5-x Cr_2O_3 (x=0.2, 0.4 or 0.8), and the modified monoaluminium phosphate having mixed phosphate with additives for higher storage life.

In the field of wear-resistant ceramic coatings for steel used in industries, two more compositions were developed with improved abrasion-resistant property (1.5-1.9 mg/cm^2 loss in weight as against 50,000 cycles in the PEI abrasion tester). A number of J-type metallic thread guides received from a synthetic fibre manufacturing plant in Madras were successfully coated with the ceramic composition.

The laboratory continued its projects on: use of rice husk ash in silicate industries, development of fibreglass, laser glass, photochromic glass, and other special glasses, red clay pottery, ceramics for electronic, electrical and engineering industries, lightweight refractories through foaming technique, vitreous enamels, mica and mica products, quartz single crystals, magnetic garnet crystals, and molecular-sieve zeolites.

Thirty-five research and review papers were published. □

National Conference on Instrumentation: Proceedings

The Central Scientific Instruments Organisation, Chandigarh, has published the proceedings of the title conference which it organized in April 1983. The proceedings (pages 383) contain 89 papers in all, presented in seven sessions: (i) Process control and instrumentation (6), (ii & iii) Microprocessor-based instrumentation (22), (iv) Environment and pollution control instrumentation (11), (v) Ultrasonic and nuclear instrumentation (9), (vi) Electron and ion beam-based instrumentation (13), (vii) Electro-optical instrumentation (17), and (viii) Quality control instrumentation (11).

Copies of the publication obtainable from: The Director, CSIO, Chandigarh 160020. □

Science to Instruments: A Kaleidoscopic View

As a part of the National Conference on Instrumentation, which Central Scientific Instruments Organisation, Chandigarh, organized in April 1983, this CSIR laboratory brought out a compendium under the title topic in honour of Dr Harsh Vardhan, who retired as its director. The publication contains 37 articles, contributed by eminent scientists, technologists and educationists, on (i) Science and Society, (ii) Science Education, (iii) R&D Management, and (iv) Instrumentation Industry and National Policy.

Copies available from: The Director, CSIO, Chandigarh 160020. □

DEPUTATION BRIEFS

Dr Harish Bahadur

Dr Harish Bahadur, Homi Bhabha Fellow at National Physical Laboratory (NPL), New Delhi, participated in the Seventh International Congress of Radiation Research (Amsterdam, 3-8

July), Twentieth IEEE Nuclear and Space Radiation Effects Conference (Gatlinburg, Tn, 18-20 July), and eighth meeting of International Society of Magnetic Resonance (Chicago, 22-26 Aug.). Dr Bahadur presented papers on the work he has been doing with Dr Ram Prashad at NPL on different facets of oscillating and structural characteristics of quartz crystals with special reference to their application in frequency standards. Following is a brief account of the NPL scientists' work as presented at the conferences:

Investigations on X- and Y-irradiation characteristics of optically non-clear quartz and electronic-grade synthetic crystals have shown that crystal imperfections in non-clear natural quartz produced a positive frequency shift of crystal resonator on irradiation, increased smoky coloration, both broad and sharp EPR lines observable at room temperature, and increased thermoluminescence compared to the corresponding characteristics of optically clear quartz.

By increasing the imperfections in non-clear quartz still further by neutron irradiation, the frequency characteristics of natural quartz simulated those of the electronic-grade synthetic crystals. Conversely, by decreasing the crystal imperfections in synthetic quartz by thermal annealing the irradiation characteristics of natural quartz could be obtained. A new annealing procedure has been developed to achieve radiation insensitivity of frequency of grown crystals. One use of such radiation-hardened devices would be for satellite-borne frequency standards for radiocommunication and frequency and time dissemination.

Dr Bahadur also visited several research laboratories where he either delivered seminar talks or held discussions with scientists on research areas of his interest. □

Dr S.K. Tandon

Dr S.K. Tandon of Industrial Toxicology Research Centre (ITRC), Lucknow, worked as a WHO fellow, on deputation from CSIR, at several university laboratories in USA from 1 May to 31 July. The ITRC scientist's research was concerned with the mechanism of nickel, cadmium and mercury poisoning and development of preventive/therapeutic measures against them. The laboratories where he worked were the Department of Laboratory Medicine, University of Connecticut School of Medicine; Department of Radiation Biology & Biophysics, University of Rochester School of Medicine; Pharmacology & Toxicology Center, University of Kansas Medical Center; and Department of Physiology & Pharmacology, University of North Dakota School of Medicine. He also studied the latest techniques employing a number of labelled metals. Dr Tandon also delivered talks, and participated in group discussions, on heavy-metal intoxication. □

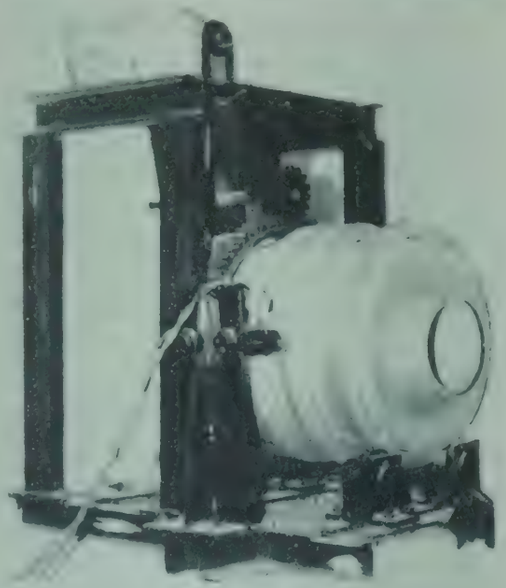
PATENTS INFORMATION

Indian Pat. 291/Del./82 (filed)

Improved electric ceramic tube rotary furnace

J.S. MURTY AND SUDIPTA DAS
Regional Research Laboratory
Bhubaneswar 751013

In pit furnaces and metallic tube rotary furnaces, which are presently used to carry out high-temperature metallurgical/chemical unit operations like roasting, calcining, sintering annealing and reduction for producing metal powders and fine chemicals, etc., the upper operating temperature is limited to the temperature that the shell can withstand. This is normally in the range 1000-1100°C. For higher temperatures, more expensive steels are required.



Improved electric ceramic tube rotary furnace designed and developed at RRL-Bhubaneswar. Is free from the drawbacks of presently used pit furnaces and metallic tube rotary furnaces.

The main drawbacks of these furnaces are due to the stationary bed, long residence time, and excessive use of the reductant if reduction is involved. When an oxidizing atmosphere is used the shell material also gets oxidized, and as a result the life of the shell is reduced and the product, contaminated.

The improved electric ceramic tube rotary furnace is free from all these drawbacks and can operate at temperatures of up to 1600-1700°C.

PERSONNEL NEWS

DR M.P. DHIR APPOINTED CRRI DIRECTOR

Dr M.P. Dhir, Scientist F, Central Road Research Institute (CRRI), New Delhi, has been appointed director of the institute (15 Sep. 1983).

Dr Dhir (born 1935) has had a brilliant academic career, obtaining his B.Sc. Engg with honours from Panjab University, M.Sc. in civil engineering (transportation/highway engineering) from Purdue University, USA, and Ph.D. from the former university. With CRRI since 1957, he has been heading its Roads Division since 1967.

Dr Dhir's contributions relate to pavements, including a new pavement

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system for desert areas, evaluation of granular mixes, improvements in bullock-cart designs, test-track research, and rural roads. He has handled consultancy assignments relating to road development in hilly and backward areas, improvement of roads, investigation on failures and formulation of corrective measures, and design and construction of the velodrome for Asiad 82.

Associated with several technical committees of the Indian Roads Congress, Indian Standards Institution, Ministry of Shipping & Transport (Roads Wing) and other bodies, he has contributed to the framing of specifications and codes of practice, drafting of manuals, and identification of R&D needs and thrusts in highway engineering.

Dr Dhir participated in the Third Conference on Structural Design of Asphalt Pavements (London, 1972), and was a resource person of Asian Development Bank for the International Seminar on Application of Appropriate Technology in the Construction and Maintenance of Roads (Manila, 1977). He has been to USA twice on study tours. Has about 150 research papers and technical reports and three patents to his credit. □

DR S.R. GOWARIKER APPOINTED CSIO DIRECTOR

Dr S.R. Gowariker, head of the Technical Physics Division of Bhabha Atomic Research Centre (BARC), Bombay, has been appointed director of Central Scientific Instruments Organisation (CSIO), Chandigarh (10 Oct. 1983).

Born 9 January 1931, Dr Gowariker took his M.Sc. and Ph.D. degrees from Bombay University. Joining BARC in 1955, he was concerned with the development of neutron counters. He was also involved with the time-of-flight experiment on the Apsara reactor. Leaving BARC in 1958, he pursued higher studies at Birmingham College of Advance Technology, UK, and gained specialized experience. As a research associate at the Physics Department of University of Birmingham, from June 1958 to April 1961, he worked with the 1GeV proton synchrotron. He developed a high-current radio-frequency-type ion source, and a new method for fabricating an accelerator column for which he obtained a British patent.

After working at Atomic Energy Research Establishment, Harwell, for a few weeks at its electromagnetic isotope separator section, he was deputed to the French Atomic Energy Commission, Saclay, to work on the electromagnetic isotope separator project.

Returning to India and BARC in 1961 as Scientific Officer in its Nuclear Physics Division, he was responsible for the design and fabrication of the electromagnetic isotope separator—the first isotope separator ever built in the country, its major components being indigenously developed.

Deputed by the Government of India to Texas A&M University, USA, for a year to take part in the construction of its 88-in. cyclotron project, he played an active role in its commissioning.

On return from USA in 1968, he had a major role in building the Variable Energy Cyclotron at Calcutta. Moving again to BARC as head of its Technical Physics Division, he had the overall responsibility of coordinating its various R&D activities.

Dr Gowariker is a fellow of Institution of Engineers (India), Institution of Electronics & Telecommunication Engineers, Maharashtra Academy of Sciences, and Indian Physical Society; and a life member of Indian Vacuum Society and Indian Physics Association. He has to his credit more than 10 publications. □

* * *

At National Chemical Laboratory, Pune, the following have been promoted, consequent on assessment, as Scientists EII [Group IV (4)] (with effect from the dates given in parentheses: Dr L.M. Pant, Dr A.S. Rao, Dr Paul Ratnasamy, Dr G.R.V. Krishnan (all from 1 Feb. 1981), Dr R.M. Joshi (1 April 1981), Shri S.P. Mukherjee (4 April 1981), Dr S.C. Sethi (2 May 1981), Dr S.M. Abhyankar (29 Oct. 1981), Dr U.R. Nayak (1 Jan. 1982), Dr P.G. Sharma (30 April 1982), Dr T.R. Ingle (24 June 1982), Dr S.H. Iqbal (22 July 1982), Dr N.R. Ayyangar (22 July 1982), Dr A.S. Gupta (18 Nov. 1982), Dr S.N. Kulkarni (18 Dec. 1982), and Dr V.S. Pansare (12 March 1983). □

SHRI T.N. TANDON

Shri T.N. Tandon, Information Officer, attached to the Publicity and Public Relations unit at CSIR Headquarters, New Delhi, has been promoted, on assessment, as Deputy Adviser (Information Officer EI) (15 Sep. 1980). An M.Sc. in chemistry from Lucknow University, Shri Tandon joined CSIR in 1963. Selected as a senior research fellow for training in science writing, he was deputed to work as science correspondent of *Link* and *Patriot* for about a year after which was assigned to *Science Reporter*. As Assistant Editor of this popular science magazine from 1965 to 1969, he wrote several articles and despatches. Selected as Information Officer of CSIR in 1969, he was on deputation with the Indian High Commission in London as Scientific Officer till 1978. □

DR KISHORE SINGH

At National Institute of Science, Technology and Development Studies, New Delhi, Dr Kishore Singh has been appointed Scientist EI (30 Sep. 1983).

An M.A. (1969) in political science from University of Delhi, Singh earned a Ph.D. (1977) in international law with

distinction from University of Paris I (Sorbonne). He received specialized courses in industrial property law from University of Paris II in 1980. Fluent in French and with a working knowledge in Spanish, Dr Singh worked as consultant with the Development Centre, OECD, and Unesco in Paris from 1979 till he joined NISTADS. □

Honours & Awards

THREE CSIR SCIENTISTS ELECTED INSA FELLOWS

Dr Krishan Lal of National Physical Laboratory, New Delhi, Dr R.A. Mashelkar of National Chemical Laboratory, Pune, and Dr S.C. Pakrashi of Indian Institute of Chemical Biology, Calcutta, are among the new 30 (Indian) fellows elected by Indian National Science Academy for the year 1983 (effective 1 Jan. 1984).

PROF. B.K. BACHHAWAT

Prof. B.K. Bachhawat, Director, Indian Institute of Chemical Biology, Calcutta, has been awarded the Biresh Chandra Guha Lecturership: 1984 by Indian National Science Academy. This honour is in recognition of his pioneering contributions to neurochemistry, protein energy malnutrition, liposomes as specific target-oriented delivery systems, glycolipids, glycoproteins, and lectin in enzyme immuno assays.

* * *

Dr M.M. Pradhan of National Physical Laboratory, New Delhi, was chosen a member, the only Indian member, of the international advisory committee of the Ninth International Conference on Infrared and Millimeter Waves (Osaka; Japan, 22-26 Oct. 1984). □

ANNOUNCEMENTS

Course on Interactive Structural Analysis and Design

This course is being conducted by Structural Engineering Research Centre, Madras, from 23 January to 3 February 1984. The objective of the course is to expose practising engineers to the use of on-line computing systems and to acquaint them with the development of software for structural engineering applications. Topics to be covered in the course include: basics of structural engineering, computers and programming, numerical methods, computer-aided analysis, computer-aided design, structural synthesis, finite elements, and microcomputer applications.

Further details and application forms available from: Dr A. Rajaraman/Shri G.V. Surya Kumar, INSTAD course coordinators, Structural Engineering Research Centre, CSIR Campus, Taramani, Adyar, Madras 600113. □

COUNCIL OF SCIENTIFIC & INDUSTRIAL RESEARCH

Advertisement No. 29/83

DIRECTOR: NBRI

It is proposed to appoint director for National Botanical Research Institute, Lucknow.

This CSIR laboratory is engaged in research and development in applied botany with reference to utilization of non-traditional/under-utilized economic plants through introduction, domestication, conservation, protection, utilization, genetic upgrading and propagation, and development of production technologies for newer plant resources, as also botany in relation to environment and energy. This involves high-level basic and applied botanical and phytochemical researches; demonstration and extension of technical know-how; and collection and dissemination of information. Areas of current interest are: algal biotechnology, tropical mushrooms, plant physiology, aerobiology, pollution tolerance/resistance in plants, biomass production for firewood, alcohol and hydrocarbons on marginal soils, newer sources of seed gums and mucilages, proteins and non-edible oils, standardization of indigenous herbal drugs and their formulations, subsidiary foods, ethnobotany, betel-vine, ornamentals, and taxonomy and morphology of lower plants.

Qualification/Experience and Job requirements: The prospective director should have high academic and research attainments in any branch of botany/agricultural or related sciences and will be required to provide a high-level leadership in the formulation of multi-disciplinary research and development programmes and projects, organizing, and coordinating team work to secure progress in the attainment of objectives of the institute. He will have the overall responsibility for the work of the institute and for maintaining an atmosphere conducive to creative work.

Salary/conditions of service: The post carries a scale of pay of Rs 2500-125/2-3000 plus allowances in conformity with the central government rules. Higher initial pay can also be considered. Consultancy earning subject to an upper limit of Rs 15,000 per year is permitted. This is a contractual appointment initially for a period of six years, the contract being renewable, and the incumbent may be confirmed.

Age: Preferably below 50 years, relaxable in deserving cases.

Free medical aid and leave travel concession are also permissible for the family. Residential accommodation in the campus is available on payment of rent.

A duly constituted screening committee will decide on the number of scientists to be invited to meet the full selection committee. The decision of the Council in this behalf will be final.

Applications from employees working in government departments, public sector organizations and government-funded research agencies will be considered only if forwarded through proper channel and with a clear certificate that the applicant will be relieved within a month of receipt of the appointment orders.

Those interested may send their curriculum vitae in duplicate in the form to be obtained from the office of the Council and send the completed forms to the Joint Secretary (Administration), New Delhi 110001, on or before 4 *January* 1984. Literature about NBRI will also be made available on request from this address. □

SCIENTISTS F

Advertisement No. 23/83

The Council proposes to appoint at Central Mining Research Station, Dhanbad, two Scientists F in the area of mining engineering/technology. Scale of pay: either Rs 2000-125/2-2500 or Rs 2250-125/2-2500-EB-125/2-2750. Further details about the post and prescribed pro forma for sending curriculum vitae obtainable from Joint Secretary (Administration), CSIR, Rafi Marg, New Delhi 110001. Deadline for receipt of applications at the above address: 1 *December* 1983. □

Advertisement No. 24/83

The Council proposes to appoint at Regional Research Laboratory (RRL), Jammu, a Scientist F in the areas of microbiology, biochemistry, biochemical engineering, chemical engineering, and organic chemistry.

Scale of pay: Rs 2000-125/2-2500

Further details about the post and prescribed pro forma for sending curriculum vitae obtainable from Joint Secretary (Administration), CSIR, Rafi Marg, New Delhi 110001. Deadline for receipt of applications at the about address: 15 *December* 1983. □

Advertisement No. 25/83

The Council proposes to appoint at Regional Research Laboratory, Hyderabad, a Scientist F in the area of chemical engineering. Scale of pay: either Rs 2000-125/2-2500 or Rs 2250-125/2-2500-EB-125/2-2750. Further details about the post and prescribed pro forma for sending curriculum vitae obtainable from Joint Secretary (Administration), CSIR, Rafi Marg, New Delhi 110001. Deadline for receipt of applications at the above address: 21 *December* 1983. □

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CSIR NEWS

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International Conference on Natural Products as Regulators of Insect Reproduction

As part of its silver jubilee celebration, Regional Research Laboratory (RRL), Jammu, organized from 29 September to 1 October an international conference on Natural Products as Regulators of Insect Reproduction.

Thirty-nine papers from invited delegates spread over nine countries, besides India, covered such areas as physiology of reproduction in the male and the female, social and environmental influences in reproduction with reference to natural products, and artificial modification of reproductive physiology by natural products.

The conference was inaugurated by Prof. R.C. Paul, Vice Chancellor of Panjab University, Chandigarh. In his address, Prof. Paul dealt with the harmful effects of organic insecticides like DDT and BHC on the health of human beings, animals and useful insects because of direct contamination of environment and also their accumulation in the human body. The discovery of insect hormones, he said, had opened up a new era in the control of agricultural pests. These insect hormones have very low or practically zero toxicity, and so are their breakdown products. Highly selective, they do not do any harm to useful insects. In spite of the great potential in the use of insect hormones of various types for control of insect pests, there are certain problems too. Dr Paul was happy to note that this CSIR laboratory had done useful research work in this field by discovering a new class of insect sterilant compounds—the anti-gonadal compounds. He was of the opinion that major breakthroughs and advances in technology have taken place in recent decades in borderline areas. This objective has been achieved by creating multidisciplinary teams, which, as the speaker noted, this CSIR laboratory has also built up. For increasing the country's food production, insect control is a must and the use of the nontoxic system of insect control is thus urgently needed, observed Prof. Paul.

Earlier, welcoming the delegates, Dr C.K. Atal, Director of RRL-Jammu, stated that this international conference had great importance for this laboratory, as its Insecticides & Insect Physiology Division had already earned international recognition for its work on anti-gonadal compounds like β-asarone and aristolochic acid obtained from *Acorus calamus* and *Aristolochia* sp. respectively.

Dr Atal traced the history of insecticides, which he divided into three periods: (i) up to 1940—A few natural products like pyrethrum, rotenoids, and nicotine used as insecticides; (ii) 1940/1945 onwards—Chlorinated hydrocarbons like DDT and BHC, carbamates, and organophosphates, the use of which had created ecological toxicity; and (iii) present period—Generation of new insecticides which can control insects through control of their reproduction or interference with their reproductive process; these are mostly plant extractives, semi-synthetics and synthetics (which are mimics of natural compounds), the method posing no pollution to the environment.

Dr Atal further stated that the very fact that higher insects and higher plants have evolved almost simultaneously and co-existed for millions of years suggests that there must be some mechanism on either side to co-exist and keep themselves in equilibrium. He drew the attention of delegates to certain other possibilities outside this area of reproductive biology, i.e. the immune mechanism whereby a plant is able to suppress immune defences of an insect. Dr Atal was of the opinion that while studying natural products, besides flowering plants, lower plants like fungi should be studied for such products. The knowledge of insect hormones, he pleaded, should be used in getting better economic yields from silkworm and honey bee by having bigger insects with desirable traits. The possibility of insects providing food in future should also be considered, he added.

In a keynote address*, Prof. K.G. Davey, Dean of Science Faculty, York University, Ontario, Canada, stated

* Read out by Prof. C. Gillott of University of Saskatchewan, Canada.

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that there are an estimated one million or so species of insects with a total population of 10^{18}, which works out to about 3 lakh insects for every man, woman, and child. Insects have penetrated virtually every available habitat, tolerating perhaps the widest climatic extremes of any taxon. Only a relatively handful of species directly affects man, his domestic animals and his crops, but the effects are devastating. One estimate has suggested that 80% of all losses between planting and harvest are attributable to insect damage. A major factor in the success of insects as pests of man and his crops is their reproductive potential.

It follows, therefore, that a target for potential control strategies might well lie in the mechanisms by which insects achieve this reproductive potential. This can be done, according to Prof. Davey, by (i) large-scale screening of natural products derived from higher plants as well as microorganisms and later synthesis of these compounds; (ii) study of the mode of action of any control agent, whether or not derived from natural products, to work out long-term safety of the compound on non-target organisms; and (iii) study of functioning of insects to suggest weak links for attack.

Prof. Davey felt that the physiology of reproduction of the male insect is a much neglected area of research which should be studied thoroughly. Though our knowledge of the female insect is much greater, there is need and scope for further investigation. He felt that we have accepted too readily the view that the stimulus of mating, which usually leads to some form of increased activity in the reproductive system of the female, is a relatively simple matter. There are signs in other organisms that the situation may be more complex. The complexity of the controls in endocrine homoeostasis is a matter of several inputs leading, via integration in the central nervous system, to an endocrine output appropriate to the demands of the reproductive system. This complexity should not discourage us, because greater the complexity the greater the potential for novel control measures, he concluded.

Copies of the souvenir brought out on the occasion and abstracts of papers will be made available to scientists working in the field of insect control, on their writing to: The Director, Regional Research Laboratory, Jammu 180 001. □

Hindi Vaigyanik aur Takniki Prakashan Nideshika: 1966-1980

The Publications & Information Directorate (PID), New Delhi, has brought out a directory of scientific and technical publications in Hindi under the title *Hindi Vaigyanik aur Takniki Prakashan Nideshika*: 1966-1980.

Smt. Indira Gandhi, Prime Minister, and President of CSIR, released the publication, on 27 October, on the eve of the Third World Hindi Conference. Speaking in Hindi on the occasion, the Prime Minister said that though the English language could be regarded as a good communication link at international level, Hindi alone could serve as the country's link language. There was no conflict however, she clarified, between Hindi and other Indian languages. All languages should be, and were being promoted, the Prime Minister added. She desired that small books in simple Hindi should be brought out for the villagers, as a result of which it would be possible to generate scientific temper among the masses. Spreading knowledge among the masses was a challenge for all of us and the future of India depended largely on the manner in which we faced this challenge, concluded the CSIR President.

Describing in his address Hindi as the language of the common man, Shri Shivraj V. Patil, Minister of State for Science and Technology, and Vice President of CSIR, said that through the use of Hindi we could easily understand benefits that science could bestow on masses. Earlier also, the Minister said, CSIR (PID) had brought out a similar directory in 1966.

Dr G.S. Sidhu, Director General of CSIR, mentioned that several labora-

Smt. Indira Gandhi, Prime Minister, and President of CSIR, releasing the Directory of Hindi Vaigyanik aur Takniki Prakashan Nideshika. Seen with her is Shri Shivraj V. Patil, Union Minister of State for Science and Technology, and Vice President of CSIR.

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C.F.T.R.I., MYSORE

tories like CFTRI, CLRI, NBRI, CIMAP, and NEERI are bringing out scientific publications in Hindi also. He made a special mention of PID's *Vigyan Pragati*, a popular science monthly whose circulation had crossed the 80,000 mark.

Shri Y.R. Chadha, Editor-in-Chief of PID, apprised the Prime Minister and invitees of the directorate's scientific information dissemination activities in general and this CSIR constituent's endeavours to popularize science in Indian languages.

All the speakers spoke in Hindi.

The Directory

The directory (royal 8vo, pp 336) lists 3344 scientific and technical books and 320 periodicals published during 1966-80. The particulars include: title of publication, names of writer/compiler, editor and publisher, year of publication, number of pages, and price. With regard to books translated from other languages, the name of the translator, and the language from which translated, are also given. A subject-wise break-up of the publications is as follows: medical sciences, 536; agricultural sciences, 428; mathematics, 343; physics, 313; engineering, 308; and chemistry 257. The number of original books (2870) far exceeds the translated ones (474).

The directory (unpriced) may be obtained from: The Manager, Sales & Advertisement, PID, New Delhi 110012. □

RECENT ADVANCEMENTS IN BUILDING CONSTRUCTION: MATERIALS AND TECHNIQUES

CBRI Get-together cum Exhibition at Bombay

The Central Building Research Institute (CBRI), Roorkee, organized on 22-23 September the title get-together cum exhibition in collaboration with Institution of Engineers (India). The aim was to acquaint field engineers, architects, builders and entrepreneurs with the new construction materials and techniques which CBRI has developed. These have the potential to reduce the cost and time of construction, apart from savings in scarce materials like cement, steel, and timber.

Three technical lectures formed the core of the get-together: (i) New developments in building systems and techniques (N.C. Bhagat), (ii) Recent developments in building materials (S.K. Misra), and (iii) Researches on climate and comfort for improving efficiency of buildings (M.R. Sharma).

The new CBRI techniques mentioned by Bhagat related to stone masonry blocks, grouted reinforced brick masonry for walling, channel units, RC planks, prefabricated brick panels, waffle units, and L-pan units for flooring/roofing. According to the CBRI scientist, by employing these techniques, better and economic houses could be built at a faster phase and these techniques were being made use of by the various building agencies all over the country. The foundation techniques developed by CBRI, viz. under-reamed, bored compaction, and granular piles, which effect 20-50% economy, had been adopted in more than 40,000 structures, which included 2- to 22-storeyed buildings, tanks, road bridges, factories, dry docks, and oil exploratory drilling rigs.

The lecture on building materials advocated the use of lime-based cementitious binders in mortar and plaster to meet the acute shortage of cement. It also called for manufacturing building materials from agro-industrial wastes like fly ash, coconut fibre, lime sludge, and colliery and mining wastes. Also mentioned in the lecture was the institute's development of an indigenous press for making sand-lime bricks.

The last lecture highlighted CBRI's work on the establishment of optimum indoor conditions for thermal comfort, design of shading device, solar radiation, and cooling loads for air-conditioning.

In his inaugural address, Shri V.S. Rane, Secretary to the Government of Maharashtra PWD, underlined the need for upgrading and innovating construction technology which would help build cheap and sturdy houses. Commending the work of this CSIR laboratory in this direction, Shri Rane called upon the participants to make use of the CBRI technologies.

It was the consensus of the house that CBRI should have a permanent office and exhibition at Bombay.

During a meeting with the press arranged on this occasion, the CBRI director, Dr Shamsher Prakash, said that the institute had taken up a project on eco-development in the Himalayas. Aimed at preventing landslides causing displacement of flora and fauna of the Himalayas, the project would involve a capital outlay of Rs 3.4 million. The work on retaining soil on mountain slopes was of strategic importance since landslides blocked movement on the border roads. Dr Shamsher Prakash also mentioned that his institute had produced a solar map depicting the pattern of sunlight and heat in various seasons in different regions of the country. The map, he added, was being used as a standard reference by the architects.

Highlighting the CBRI technologies for harnessing agro-industrial wastes, and for improving the quality of life of the rural poor, Dr Prakash said that several states in the country had adopted CBRI techniques of stone masonry blocks and prefabricated roofing/flooring units for housing the economically weaker sections of the society. These techniques had resulted in savings in cement and steel for more sophisticated urban housing projects, he added. □

OPEN HOUSE DISCUSSIONS ON CECRI'S WORK

The Central Electrochemical Research Institute (CECRI), Karaikudi, arranged an open house with the industry on 28 September at which the laboratory's scientists presented their work in the field of electrowinning, electrometal-

lurgy, fused-salt electrolysis, and electroplating and metal-finishing.

While presenting the work on hard chromium plating, Shri R. Subramanian mentioned the development of a new technique for depositing fully microporous chromium by a single-stage plating without using any additional bath or any insoluble solid particles. He also spoke on a nickel plating bath for bright nickel iron alloys as a substitute to bright nickel plating on aluminium. The CECRI-standardized process for black coating solar collector panels was also mentioned.

Speaking on fused-salt electrolysis, Shri P.S. Desikan said that CECRI had entered into collaboration with Defence Metallurgical Research Laboratory (DMRL), Hyderabad, for setting up prototype magnesium cells for captive use in the DMRL's titanium sponge facility.

The direct electrochemical reduction method and suspension electrolysis method and the advantages of the former were the topic of Shri P.V. Vasudeva Rao's talk.

Achievements in the field of anodization and electrorefining were narrated by Shri S. John and Shri R. Srinivasan respectively.

Forty delegates attended the meeting. □

Tiny cement plant commissioned

Based on technology developed by Regional Research Laboratory (RRL), Jorhat, a cement plant of 20 tonnes/day capacity was commissioned at Bharat Cement Industries (BCI), Vatva, Ahmedabad, on 18 September. Scientists and engineers of RRL-Jorhat assisted the engineers of the firm in successfully commissioning the plant in a record time of four months.

The CSIR laboratory offered the technology on a turn-key basis to BCI. Ganesh Industries Services Agency (GISA), Gandhidham, Ahmedabad, consultant to RRL-Jorhat on tiny cement plants, offered consultancy services, covering the complete detailed design package. GISA also extended guarantee to the client on the technical adequacy of the engineering design and performance of the integrated plant on quality product in accordance with ISI specifications. Laxmi Engineering Works, Udaipur, is the authorized fabricator of vertical shaft kiln tiny cement plants. The total cost of the plant and equipment is about Rs 19 lakh and the total cost of the project including land and building, etc., around Rs 50 lakh. The entire 20 tonnes/day production of cement would be consumed by Ahmedabad itself. The total employment at the plant would be around 20 per day, excluding labour employed in mining, transport, and handling. The direct and indirect labour benefited by the plant would be 100 families a day. □

Glass working lathe commissioned

A glass working lathe, with a number of accessories, for fabricating sophisticated scientific research equipment was commissioned at Central Electrochemical Research Institute (CECRI), Karaikudi, on 28 October.

The salient technical features of the lathe are:

Max. size of glass tube which can be handled:	160 mm
Max. size of flanges that can be made:	250 mm
Max. size of ground joints:	A60.

The lathe can be used for fabricating spiral glass tubular coils of varying diameters and pitches. Arrangements exist for making glass tube metal seals and other normal functions.

The lathe was commissioned by the CECRI's advisory council's chairman Shri R.V. Ramani, Managing Director of Mettur Chemicals & Industrial Corporation Ltd. □

R&D BRIEFS

Mechanical dehulling of musk melon seeds

Musk melon seeds are commonly used in sweets and snack foods. The traditional method of removal of hull from the seed manually is tedious and time-consuming. The Ludhiana experimental station of Central Food Technological Research Institute has developed a simple process for mechanical dehulling of musk melon seeds. The process consists in conditioning, dehulling, and separating the seeds. The dehulling plant (capacity, 100 kg/hr) is estimated to cost Rs 25,000 and the dehulling cost works out to a rupee per kilogram of seeds. With some modifications, the plant can also be used for dehulling other melon seeds.

* * *

Chromite beneficiation

The Regional Research Laboratory, Bhubaneswar, has prepared the final report on beneficiation of the chromite sample supplied by the sponsor of the project. The study has shown that it is possible to beneficiate the sample to the grade acceptable to metallurgical and refractory industries by merely deslimming the crushed feed using a classifier.

* * *

Axisymmetric air intake tests

The National Aeronautical Laboratory (NAL), Bangalore, has completed a project on axisymmetric air intake tests in its 0.3 m wind tunnel for the air intake models being developed by Indian Institute of Technology (IIT), Madras, for Defence Research & Development Laboratory, Hyderabad. Sponsored by IIT, the project involved fabrication of some components of the model and 247 blowdown operations in the tunnel.

* * *

Aerodynamic studies of automobiles

NAL carried out experimental studies on scaled models of two jeeps (CJ3B and CJ5A) under a project sponsored by Mahindra and Mahindra. Composite models were tested in the 0.9 m tunnel and the boundary layer tunnel for determining the drag coefficient and for visualizing the flow field. The results indicated a significant scope for reducing air resistance and improving fuel economy. □

PROGRESS REPORTS

CIMAP Annual Report: 1982-83

The annual report of Central Institute of Medicinal and Aromatic Plants (CIMAP), Lucknow, for 1982-83 shows that the laboratory investigated 18 projects comprising about 100 sub-projects. Of these, 8 sub-projects were completed and 13 were discontinued.

One of the major achievements of the institute was the development of a new strain of Japanese mint (*Mentha arvensis*). The new strain, designated CIMAP MS-1, has a higher oil content (0.8-1.0%) than the existing strain (0.4-0.6%) under cultivation and its menthol content varies from 82% to 85%; 60% of menthol can be easily recovered by chilling versus 40-45% from the cultivated strain. Introduction of this strain is expected to save the country's menthol industry from the crisis it has been facing owing to genetic deterioration of the local strain of the Japanese mint. In most of the crop grown in farmers' fields in the country, menthol content has gone down to 58-60% with more than 20% menthone, with the result that very-little menthol is obtained from the Japanese mint oil by chilling. Introduction of this strain would increase the per hectare yield of menthol and lead to a considerable reduction in the cost of production. Results of field and sand culture experiments have further shown that growth regulators can modify the growth and oil content of *M. arvensis*.

Three clones of opium poppy (*Papaver somniferum*) have been found most promising with respect to latex yield, giving 97, 88 and 67 kg/ha of latex as compared to 53 kg/ha, being obtained from the local variety. Such superior clones, when released to farmers, would increase per unit area yield of opium, with the result that larger areas which are cultivated for opium could become surplus and could be utilized for food crops.

A pilot plant with modern technology for extraction of rose oil, of capacity 25 kg rose flowers per batch, was designed, fabricated and installed at Hasayan village (Aligarh dist.). The oil so obtained from *Rosa damascena* flowers was found to be at par with the Bulgarian rose oil. The process was scaled to 125 kg flowers per batch during March 1983 and a yield of 0.025% to 0.035% of oil was obtained. This recovery of oil (0.03%) is slightly higher than that obtained in Bulgaria, a leading producer of rose oil in the world. The recovery of oil is more than four times that obtained with the use of the country-made stills. The technology is being purchased by Agra Mandal Vikas Nigam, who are expected to set up a commercial plant. About 800 g of oil produced on pilot scale was sold to a firm at Rs 1.00 lakh/kg.

An improved technology for distillation of vetiver roots was also developed. This gives an average yield of 0.20-0.25% of oil as compared to 0.06-0.10%, being obtained with the existing technology wherein country made distillation units are used for distillation of the North Indian vetiver.

An erect-growing and unbranched mutant of *Hyoscyamus niger*, which contains twice as much of alkaloids as the parent and can withstand high population pressure, was stabilized.

Studies on Citronella Java indicate that the nonavailability of copper and iron decreases the oil content. Absence of copper and iron also decreases citronellal, geraniol, and geranyl acetate. However, citronellal content is increased by copper deficiency.

Under the laboratory's rural development programme, more farmers were persuaded at Lucknow, Pantnagar, and Bangalore to start cultivation of the Japanese mint, citronella and palmarosa and improve their economy. Distillation facilities were also provided, and ergot of rye and pyrethrum were produced in farmer's field in Kashmir Valley as a part of the rural development programme.

The institute produced medicinal plants and essential oils worth about Rs 6.7 lakh from trials.

A new regional centre of CIMAP was set up at Boduppal, Andhra Pradesh. □

Electrometallurgy Bulletin

The Madras Unit of Central Electrochemical Research Institute (CECRI), Karaikudi, has started the publication of the title periodical. The bulletin, a six-monthly, gives information on new processes/products in the field of electrowinning and refining, highlights of recent R&D developments in India, statistical information on metallurgical industries, profiles of Indian and foreign electrometallurgical industries, transfer of technology, schedule of seminars and conferences, state-of-art reviews, etc. The inaugural issue (June 1983) has been released.

The bulletin (annual subscription, Rs 100; single copy, Rs 50) may be obtained from: The Publication Manager, Electrometallurgy Bulletin, CECRI Unit, CSIR Complex, Madras 600 113.

Batteries Bulletin

Another new bulletin of CECRI is devoted to batteries. The first issue of the bulletin, a six-monthly, was released by Dr G.S. Sidhu, Director General of CSIR, on 12 October. □

PERSONNEL NEWS

Appointments/Promotions

At Central Glass & Ceramic Research Institute, Calcutta, the following have been promoted on assessment (with effect from the dates given in parentheses).

As Scientist EI

Dr S. Thiagarajan, Shri B.M. Agrawal, and Dr B. Mukherjee (all from 1 Feb. 1981); Shri N.M. Mathur and Shri M. Chakraborty (both from 1 April 1981); and Dr M.M. Gupta (1 April 1982)

As Scientist C

Shri M.R. Saha (1 Feb. 1981), Dr Dipak Chakraborti (16 Jan. 1982), Shri

S.N. Mukherjee (15 Feb. 1982), Dr A.C. Das (18 April 1982), Shri T.P. Bhattacharjee (22 May 1982), Dr R.N. Dwivedi (4 June 1982), and Shri A.K. Roy (3 March 1983)

As Scientist B

Shri A.K. Sanyal, Shri Ashok K. Nandi, Shri M.C. Ghosh, Dr S.K. Bhattacharjee, Shri B.N. Ghosh, Shri P.K. Kundu, Dr S.K. Basu, Shri S.K. Chattopadhyaya, Shri Asis K. Nandi, Dr (Smt). M. Saha, Dr K. Sengupta, Shri B.K. Chakraborty, Shri B.L. Mitra, and Shri S.K. Sen (all from 1 Feb. 1981); Shri S.C. Boral, Shri A. Dasgupta, Dr (Smt.) S. Majumdar, Smt. L. Rajagopalan, Shri S.B. Sanyal, Shri A. Majumdar, Shri A.K. De, Dr S. Biswas, and Shri M.K. Sinha (all from 1 Feb. 1982); and Shri B.P. Ghosh, Shri A.K. Basu, Dr (Smt.) D. Paul, Shri T.K. Mukhopadhya, Shri A.K. Guha, Smt. N. Biswas, Shri A.C. Sikdar, and Shri P.K. Mondal (all from 1 Feb. 1983)

As Technical Officer B

Shri B. Das (1 Feb. 1981)

Also at CGCRI, Shri Barundeb Mukherjee has been appointed Scientist C (26 Aug. 1983) and Dr S. Datta Scientist B (4 April 1983). □

Transfers

Shri M.S. Kaushal has joined Central Road Research Institute, New Delhi, as Administrative Officer (Gr I) (17 Aug. 1983), on transfer from Central Leather Research Institute, Madras. □

Honours & Awards

DR R.A. MASHELKAR

The election of Dr R.A. Mashelkar, head of the Chemical Engineering Division of National Chemical Laboratory (NCL), Pune, as a fellow of Indian National Science Academy has been announced [*CN*, 33(1983), 168]. This honour comes to him in recognition of his outstanding contributions to polymer science and engineering, an area in which he has published about 120 papers. Earlier this year, Dr Mashelkar won the prestigious Herdillia Award of Indian Institute of Chemical Engineers

[*CN*, 33(1983), 8] and he was also elected a fellow of Indian Academy of Sciences.

Dr Mashelkar has made outstanding original contributions in, for example, diffusion phenomena in macromolecular media, polymer reaction engineering with special reference to polycondensation and copolymerization reactors, rheology, and non-Newtonian fluid mechanics. Some of his notable contributions have been in industrial polymer reactor modelling and simulation (which have led to productivity improvement in Indian industry), development of unified frameworks for modelling transport phenomena in diverse polymeric media and elucidation of macromolecular migration phenomena in non-homogeneous flow fields, thereby enabling clarification of a number of anomalies which had clouded the literature.

Dr Mashelkar has presented invited and plenary lectures in a number of international conferences: First World Congress on Chemical Engineering (Amsterdam, 1976), VIII International Congress on Rheology (Naples, 1980), IUPAC International Symposium in Polymer Science and Applications (Madras, 1980), IUPAC International Symposium on Polymer Processing, and Structure and Properties (Athens, 1982). He also presented by invitation the 'Special University Lecture' at University of London in 1982. An associate member of International Committee on Rheology, he has been on the editorial boards of several journals such as *Rheologica Acta*, *Chemical Engineering Communications*, *Polymer Materials*, *Indian Journal of Technology*. and *Advances in Transport Processes*.

The polymer science and engineering activity which Dr Mashelkar has initiated at NCL has led to the establishment of a unique school in this area in the country. He has contributed, in an advisory capacity, to the establishment of new polymer science courses in the country and also to the definition of national-level R and D thrusts in polymer science and engineering. He has been a consultant to a number of industrial organizations producing chemicals and polymers and his advice has been sought by both academia and industry.

* * *

DR KRISHAN LAL

The election of Dr Krishan Lal, head of the Materials Characterization Division of National Physical Laboratory (NPL). New Delhi, to the fellowship of Indian National Science Academy has been announced [*CN*, 33 (1983), 168].

Dr Krishan Lal has established at NPL an active group working on crystal growth and lattice imperfections. Working in association with Dr A.R. Verma, he and his group have developed a number of sophisticated equipment and advanced techniques for growing and characterizing nearly perfect crystals. Vapour-grown whisker crystals have been shown to be free of axial screw dislocations: diffuse X-ray scattering near the reciprocal lattice points of nearly perfect single crystals has been shown to be due to point defects and their aggregates and not due to phonons. Electric field-induced microstructural changes in LiF, CdS and Si

crystals have been observed and characterized.

Dr Krishan Lal has more than 50 research papers and edited a book, 'Synthesis, Crystal Growth and Characterization' (North-Holland Publishing Co., Amsterdam, 1982).

On invitation from the International Union of Crystallography, Dr Krishan Lal organized, as director, an International School of Synthesis, Crystal Growth and Characterization of Materials for Energy Conversion and Storage (New Delhi, 1981). He was consultant to the Commission on Crystal Growth and Characterization of the International Union of Crystallography (1981-84), and member of the National Committee for Crystallography of the INSA for IUCr (1975-78, 1978-81). He worked as an IBM Indian Research Fellow at the IBM Thomas J. Watson Research Center, Yorktown Heights, New York, in 1971-72, and as guest scientist at the Physikalisch-Technische Bundesanstalt, Braunschweig (FRG) in 1980 and 1983. As well as visiting/working at several universities and research institutions in Japan, USSR, USA, and Europe, he has delivered lectures at some of them. □

Dr K.L. Handa, ex-Scientist of RRL-Jammu, institutes an award

DR K.L. DHAR BAGS THE FIRST AWARD

Dr K.L. Handa, who retired in 1978, has instituted an award known after him as 'K.L. Handa Award' to promote research in chemistry at Regional Research Laboratory (RRL), Jammu. Dr K.L. Dhar, head of the Division of Medicinal and Aromatic Chemistry, has been selected for this award for the year 1982.

The award was formally presented to Dr Dhar by Shri M.R. Puri, Vice Chancellor of Jammu University, at a function held in the laboratory on 5 September. The award consists of a cash prize of Rs 5000 and a citation.

Speaking on the occasion, the chief guest Shri Puri appreciated Dr Handa's benevolent gesture of funding the prize, which in the years to come, would provide, he added, great incentive to young scientists. Also appreciating the work done in RRL-Jammu since its inception to the present day, Shri Puri commended the stewardships of its directors from Col. R.N. Chopra to Dr C.K. Atal. Apart from doing fundamental research, scientists should develop technologies for the country's day-to-day needs, added the Vice Chancellor. In his address (read out by Prof. K.K. Kapur), Dr Handa presented a summary of work done by him and his colleagues.

Earlier, welcoming the chief guest and others, Dr Atal also appreciated Dr Handa's gesture.

The Awardwinner

The citation says that Dr Dhar has made significant contributions towards the chemistry of natural products by way of structure elucidation, synthetic modification of terpenes, alkaloids, and

coumarins. He has also contributed substantially to the development of technology in the field of essential oils.

Dr Dhar, who has been with this laboratory since 1970, is responsible for establishing an advanced school of chemistry with specialization in medicinal chemistry and essential oils. His academic as well as applied work has been well recognized. He has guided 18 Ph.D. students and published 135 papers. Besides assigning structures to more than 50 compounds, which include steroidal lactones, lignans, alkaloids, terpenoids, flavonoids, and glycosides, he has developed some new reactions in the area of coumarins, isoflavones, and phenylpropanoids. He has contributed to the development of a number of technologies relating to the production of ionones, hydroxycitronellal, rose oxide, rose crystal, hydrogenated and disproportionated rosin, geraniol, and citronellol. He is also associated in the laboratory's drug development programme as a result of which drugs like vasicine and Sallaki have been produced.

Dr K.L. Handa

Dr K.L. Handa, who retired from RRL-Jammu in 1978 and held the position of Scientist EII at the time of retirement, is considered an outstanding organic

chemist, he having specialized in the chemistry of natural products, especially of medicinal and aromatic plants. He is a fellow of Institute of Chemists (India), of Royal Institute of Chemistry (London), and of National Academy of Sciences (India).

Dr Handa has to his credit over 200 research papers on the chemistry of medicinal and aromatic plants, besides six patents, 15 review articles, and 8 books and monographs. To his credit also stand a number of processes commercialized, some of the important ones being: (i) diosgenin from *Dioscorea deltoidea* and *Solanum* spp.; (ii) 16-DPA from diosgenin; (iii) tropane alkaloids from *Atropa* spp., *Hyoscyamus* spp., and *Datura* spp.; (iv) xanthotoxin from *Heracleum candicans*; and (v) berberine from *Berberis lycium*.

After retirement, Dr Handa continued his research work for some time as Scientist Emeritus at the same laboratory.

The award

Dr Handa has kept in fixed deposit a sum of Rs 50,000 the interest on which

will be given away as the award to a scientist working in the field of chemistry at RRL-Jammu.

In the preamble to the award, the donor observes: "This award is instituted as a mark of gratitude towards this institute (RRL-Jammu) where I devoted a major part of my life in the pursuit of science."

* * *

DR T.N. GURU ROW

Dr T.N. Guru Row of the Physical Chemistry Division of National Chemical Laboratory (NCL), Pune, has been selected as a Young Associate of the Indian Academy of Sciences, Bangalore, for his significant contributions in the field of X-ray crystallography.

The scheme has been initiated by the academy from this year to encourage young talented scientists of less than 35 years in the country. Dr Row has published over 40 papers in X-ray crystallography. □

OBITUARY

SHRI C.V.G. REDDY

Shri C.V.G. Reddy, Scientist EI, head of the Chemical Oceanography Division of National Institute of Oceanography (NIO), Goa, expired on 10 October 1983 at Karaikudi.

Shri Reddy (born 29 Nov. 1930), M.Sc., who was a CSIR research fellow since 1963 during the International Indian Ocean Expedition (IIOE), joined NIO as Scientist B in 1966. He participated in the oceanographic cruises of *INS Kistna* during IIOE and later in the cruises of the *RV Gaveshani*. He developed the Chemical Oceanography Division over the past 10 years. Working initially on the chemistry of the sea, he initiated latterly a project on the organic chemicals from the sea, which led to the identification of about two dozen marine plants and animals, the extracts from which can be utilized in the manufacture of pharmaceuticals. Visiting many oceanographic institutes in UK and USA, he utilized the experience in organizing the research activities at NIO. A distinguished chemical oceanographer in this country, he has to his credit more than 60 research papers.

* * *

SHRI A.S. RAIZADA

Shri Ajay Shanker Raizada, Documentation Officer EI, Indian National Scientific Documentation Centre (Insdoc), New Delhi, expired on 7 November 1983 at New Delhi. He was 50.

With Insdoc since 1955, he was an M.Sc. in physics, and had obtained high

professional qualifications in documentation and information science. Serving Insdoc in various capacities with distinction, he contributed immensely to its growth and development. He was, for example, responsible for introducing and developing computer-based information activities in this CSIR's constituent. He had special training in Canada, acquiring expertise in computerized SDI service. He had served as a consultant for Unesco on some occasions. Professionally active in the specific area of information technology, he participated in many national and international meetings and associations. □

ANNOUNCEMENTS

Course on Precast Concrete

A course on Precast Concrete will be conducted by Structural Engineering Research Centre, Madras, during 13-24 February 1984. The course is meant for engineers from consulting/contracting firms, government organizations, universities, and research institutions, who are already engaged in the design and construction of reinforced and prestressed concrete structures.

The course content: Principles of analysis and design; materials; standardization and modular coordination; methods of manufacture; precast reinforced and prestressed concrete linear and plate elements; mass-produced precast concrete components; prefabricated construction; precast industrial structures; miscellaneous applications; quality control, inspection, and testing; handling, transportation, and erection; tolerances; joints and connections; new developments; and case studies.

Further details available from Shri V.S. Parameswaran, course coordinator, Structural Engineering Research Centre, CSIR Campus, Taramani, Madras 600 113.

* * *

Tanners' Get-together

An annual feature of Central Leather Research Institute, Madras, the Tanners' Get-together, 19th in the series, will be held at this laboratory from 31 January to 4 February 1984. The topic for discussion is: National perspective for development of leather and allied industries.

Further details obtainable from: The Conveners, Tanners' Get-together: 1984, Central Leather Research Institute, Adyar, Madras 600 020. □

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C.F.T.R.I., MYSORE

Unesco-NISTADS Workshop on Choice of Technology for Endogenous Development

A Unesco-sponsored workshop on 'Choice of Technology for Endogenous Development', organized by National Institute of Science, Technology and Development Studies (NISTADS), New Delhi, provided, in large measure, guidelines for the implementation of the country's technology policy. The workshop, held in New Delhi from 24 to 27 October, was within the framework of Unesco's programme on 'Reflection on the choice and evaluation of national or foreign technologies and on determining their adaptability for the purpose of endogenous development'.

The workshop also surfaced a view that a technology plan for the country may be developed within the framework of the Technology Policy Statement.

The workshop was inaugurated by the Union Minister of State for Science and Technology, Shri Shivraj V. Patil, who in his address emphasized the need for developing technologies indigenously and for attaining self-reliance. He underscored the need for a proper information system to implement the recently announced Technology Policy Statement.

In his keynote address, Prof. Yash Pal, Chief Consultant to Planning Commission, elucidated the concept of endogenous development. It is indispensable, he said, to internalize the technology acquired from foreign sources and to build technology development capacity to generate technology indigenously. He also emphasized the importance of building up human skills for technology development.

The Director General of CSIR, Dr G.S. Sidhu, highlighted the magnitude of the capability of R&D in India, and urged the participants to discuss suitable criteria for choice of technology for utilizing R&D capabilities.

The workshop, spanning five technical sessions, besides the inaugural and concluding sessions, addressed: (i) Concepts and issues, (ii) Criteria for choice of technology and national development objectives, (iii) Role of indigenous R&D and choice of technology, (iv) Acquisition of foreign technology and endogenous development, and (v) Mechanism of choice of technology and its management.

Shri Shivraj V. Patil, Union Minister of State for Science and Technology, and Vice President of CSIR, delivering his inaugural address at the Unesco-NISTADS workshop on Choice of Technology for Endogenous Development. Seated on the dais (from left) are: Mr M.P. Derkatch, Director (a.i.) Unesco Regional Office of Science & Technology, New Delhi; Dr G.S. Sidhu, Director General of CSIR; Prof. A. Rahman, Director of NISTADS; and Prof. Yash Pal, Chief Consultant to the Planning Commission.

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Calling upon the participants to evolve criteria for choice of technology which could be recommended for use in the decision-making process, Prof. A. Rahman, NISTAD's director, emphasized that relationship between the basic needs of the people of developing countries and the development of technology should be viewed in a holistic manner. Every technological innovation has interlinkages with other social, cultural and economic factors, he added.

In-house R&D could play a major role in modernizing the industrial production. Stating this, Shri Arvind N. Lalbhai, instanced the textile industry in which the obsolete technology needs to be upgraded by proper technological choices.

Dr C.V.S. Ratnam, Adviser, UN Regional Centre on Transfer of Technology, Bangalore, mentioned the three basic criteria for choice of technology, viz. need-based, resource-based, and national security. Technology chosen should not only be energy-efficient but should make use of human resources, he emphasized.

The participants voiced the need to undertake technological forecasting for making technological choices for development of new technologies as well as for upgrading the existing technologies. Also stressed was the need for undertaking comprehensive technology assessment before a decision is taken for selecting a technology for its development and introduction in the society.

The need for devising a comprehensive information base with a view to regulating the acquisition of foreign technology was pointed out by a NISTADS scientist, Dr Kishore Singh. Dr M. Satyapal underlined the need for working out evaluation procedures as regards imported technology so that the indigenously generated technology may receive adequate attention in the choice of technology. Dr Ram K. Iyengar, Managing Director, National Industrial Development Corporation of India, mentioned that consultancy agencies could make major contributions in the acquisition of technology and its indigenization in the country.

The deliberations of the workshop surfaced a number of issues addressed to the government as well as public sector enterprises, R&D establishments, consultancy and design engineering organizations, and the private sector.

Some of the more important suggestions and recommendations that emerged from the deliberations of the workshop are:

The choice of technology cannot be divorced from the national objectives, the desired social change, and its direction and the future requirements and possibilities, to the extent that the latter could be foreseen.

If the choice of a technology is to be made from the point of view of meeting national objectives, social change and future needs, the division of technology as appropriate or sophisticated, or rural or urban, becomes artificial and hence meaningless. Furthermore, the existing knowledge, which goes under the label of traditional, locally available natural resources and technologies based on them, should also be taken into account. R&D inputs should be provided to further develop and utilize the technologies for the process of development.

In the context of the current and future national needs for making a technological choice and the fact that the latest technology is unlikely to be available, the upscaling of national R&D capabilities and building of a strong R&D infrastructure becomes inescapable.

An exclusive concern with either social, economic, technological or cultural factors in the choice of technology, irrespective of the latter's import or indigenous development, is not likely to meet the national objectives.

There is a need for developing a national perspective and, based on it, to develop a technology plan. The choice of a specific technology should be made in this context, taking into account national and socio-economic objectives of the country. The government should involve the R&D systems, academics, and public and private sector industry in evolving a technology plan within the framework of the Technology Policy Statement and in its implementation.

Socio-economic and cultural factors, in addition to technological factors, may be taken into account in deciding the type and level of technology and the size of industry it may engender. In doing so, not only the existing conditions are required to be taken into account but also the objectives of social change, the interest of under-privileged and the direction of national development. In trying to look into these factors, since there is a considerable vagueness in the existing definitions of these factors, there is a need both for specificity and quantification as also evaluation of the impact of technological choices to provide feedback to decision makers.

To make balanced choices there is a need to develop an information system and necessary information culture. It is essential to have an adequate and efficient machinery to feed the information to decision makers. In addition, there is need for developing the necessary information, hardware as well as software.

Analytical studies should be undertaken to cover policies and trends in advanced countries as well as developing countries. Studies may also be undertaken to forecast the socio-economic interface of technologies and technology assessment.

There is a strong need for active involvement of R&D infrastructure in the choice of technology. Necessary machinery may be developed to study the technological, economic and socio-cultural factors, and the framework in which the technology is expected to operate and develop the industries. The involvement of R&D infrastructure is particularly necessary where the questions of import of technology, terms and

conditions of import, and its further development are concerned.

The upshot of the workshop was that a suitable machinery may be established to implement the recommendations, and to monitor their impact on achieving the objectives and goals. □

High-Temperature Greases

WORKSHOP AT IIP

A two-day workshop on High-Temperature Greases, organized at Indian Institute of Petroleum (IIP), Dehra Dun, on 29-30 September, discussed the viewpoints of the manufacturers and the consumers on current quality levels and future needs of the high-temperature greases, status of imports, and major problems being faced by the industry in application. The objective was to evaluate current and future course of R&D investigations. Some 10 delegates from over 20 organizations participated. In all, 10 papers were presented and two lectures (including one keynote lecture) delivered in two sessions devoted to: (i) Development of high-temperature greases and (ii) Performance evaluation of greases.

The papers in the first session highlighted the efforts made in the country to formulate the greases for high-temperature applications. One of the papers reported a grease based on phenylmethylsilicon and silica for antifriction bearings, ball threaded pairs and joints which worked for long durations at 300°C and short durations at 400°C. Clay-based diester and poly-α-olefin greases were also reported. Future needs of the high-temperature greases and advantages of each type of grease were also discussed. The advantages of aluminium complex-, lithium complex- and synthetic hydrocarbons-based greases were described and the aluminium complex grease was identified as the steel mill grease because of its low cost and availability of the raw materials.

As greases are exposed to severe conditions of temperatures, speeds, and sometimes shock-loads during operation, the importance of test methods for meaningful evaluation of greases was the main subject of the second session. Also discussed were the performance requirements of traction-motor bearings and steel plants. With regard to traction-motor bearings, the problem of caking of the grease and lubrication failure resulting in seizure was discussed in some cases.

A paper which discussed the relative performance of lithium complex-, polyurea- and clay-based greases indicated that the lithium-complex greases were superior to other greases. It was reported that friction coefficient as observed on SRV tester differentiates between the performance characteristics of various types of greases.

Taking note of the high degree of industrialization in India, Mr E. Van Damme of OPTIMOL of FRG, in his keynote address, underscored the need for generating technology in the country, for high-temperature greases whose demand would go on increasing. The increase would be mainly owing to contact design needs, high speeds, higher loads, high process temperatures, and need for maintenance-free operations. In FRG, according to Mr Damme, these greases were classified into three categories depending on their suitability up to 180°, 220° or 300°C. For continuous operation above 300°C, there was in the near future no possibility of formulating such a grease. The speaker emphasized that some of the so-called high-temperature applications could be met by high-performance greases which had good lubricity, stable structure, stability towards oxidation and heat, and rust resistance.

The major recommendations that emerged from the discussions:

1. Development of aluminium complex greases should be pursued to the stage of commercial manufacture, keeping the cost and availability of raw materials in view.

2. Efforts should be made to replace imported clays with modified indigenous bentonite.

3. New base materials like polyolefins should be exploited for developing better greases.

4. To provide a significant backup to grease industry, efforts should be made to develop indigenous test-rigs for performance evaluation through national laboratories, IITs, and other R&D centres.

5. Better coordination should be established between industrial research centres and IIP, sharing specific areas of work. Basic long-term research in specific areas recognized through mutual discussion could be pursued at IIP.

The workshop was inaugurated by the IIP director Dr I.B. Gulati, who in his address stressed the need for indigenous development of high-temperature greases. □

Industry sponsors development of processes for Captan and Captafol at RRL-Jorhat

A private industry, Sudarshan Chemical Industries Limited, Pune, has entered into an agreement with Regional Research Laboratory (RRL), Jorhat, for development of process know-hows for Captan and Captafol on a sponsorship basis. Under the terms of the agreement, RRL-Jorhat will develop the process know-hows on Captan and Captafol and transfer them to the party for commercial exploitation. This CSIR laboratory will further act as an engineering consultant to the firm for preparing and providing basic engineering package for a composite plant with a capacity of 150 tonnes per annum for commercial production of the fungicides.

Captan and Captafol are important pesticides possessing fungicidal properties. At present the country's demand for these two fungicides is estimated at 300 and 200 tonnes per annum respectively, and these are entirely met through import. □

Directions of growth of biomedical knowledge through a scientometric technique

At Indian Institute of Chemical Biology (IICB), Calcutta, Shri I.N. Sengupta has quantitatively evaluated, using the scientometric technique, the recent growth of the basic biomedical sciences and the factors responsible for the steady increase in research in these sciences in the period following World War II. A new bibliometric technique based on citation analysis was developed for the purpose, and applying it, an in-depth study was made of the growth of biomedical literature. Data collected from the respective 'Annual Reviews' published by Annual Reviews Inc., Palo Alto, California, as source journals, were used for the study.

By using the technique the ranking lists of periodicals were prepared in the disciplines of medicine, biochemistry, physiology, microbiology, and pharmacology. The lists have helped this CSIR laboratory, says the researcher, to streamline its subscription policy, as it clearly identified only a handful of core journals which cover a maximum amount of contemporary literature of the subjects concerned.

Analysis of citations in the *Annual Reviews of Medicine* according to subject classification has brought out the importance of journals of basic biological sciences to the present-day medical research. The study has brought out the predominant position of biochemical research in the total scientific effort, and the increasing bias of cognate disciplines towards the methodologies and concepts of biochemistry. Important features of current research in biochemistry, as revealed by the study, are its increasing significance to fundamental scientific knowledge and the shifting of interest to special fields of practical value like biochemical pharmacology, endocrinology, and immunochemistry. The chronological distribution of citations indicates that the current scientific thinking and publications are the main stimulus to research in biochemistry. The frequency of citations of the proceedings of national and international conferences has been taken as an index of the increasing role of personal contacts and discussion in the stimulation of creative research.

A method of analysis of the number of citations in relation to the size of a journal and the average length of the papers it publishes has been developed and used in these studies. The analysis yielded parameters for assessing the scientific interest of a journal in relation to its bulk and of the scientific value of the papers in relation to compactness of presentation.

Based on the results, an extension of Bradford's law of scattering has been proposed: During phases of rapid and vigorous growth of knowledge in a scientific discipline, articles of interest to that discipline appear in increasing number in periodicals distant from that field.

Analyses of the recent growth of the literature in physiology, microbiology and pharmacology have brought out the predominant influence of biochemical ideas in the overall structure of the present-day research in these areas, and the increasing application of biochemical methodology and concepts in studies in these subjects. The high ranking of journals of general science in all these three areas indicates that the way knowledge accrues in them is significant to biology as a whole. In the case of physiology its long-established interdependence with biological and medical sciences is shown to be still continuing. On the other hand, in microbiology, interest in its medical aspects has declined and is directed towards molecular genetics and biology.

As for pharmacology, the subject is going through a phase of intense activity in border areas with physiology and biochemistry. Thus journals in subareas concerned with neuropharmacological studies and drug action at the cellular and molecular levels occupy high positions in the ranking list.

Shri Sengupta was awarded Ph.D.(Sc.) degree by Calcutta University for his thesis based on the study. □

DR EUGENE GARFIELD AT PID & NISTADS

Dr Eugene Garfield, the renowned US information scientist, editor and publisher of *Current Contents*, *Science Citation Index* and several other search tools, and President of Institute for Scientific Information, Philadelphia, USA, was in New Delhi from 10 to 12 November, as a guest of Publications & Information Directorate (PID), New Delhi. On 11 November, he had a meeting with Shri Y.R. Chadha, Editor-in-Chief, and senior journal editors of PID when he discussed the steps journal editors should take for obtaining adequate and prompt coverage of scientific and technical journals in international abstracting, indexing and current awareness services.

Dr Eugene Garfield speaking at NPL, New Delhi, 11 Nov. 1983

Dr Garfield delivered two lectures the same day. The first, sponsored by PID and held at National Physical Laboratory auditorium, was presided over by Dr Nitya Nand, Director of Central Drug Research Institute, Lucknow. Dr Garfield spoke on "Information—Key to Science Development". Explaining the basic principles of citation indexing and its usefulness in evaluative bibliometrics, with the help of slides, he went on to show how emerging research fronts could be identified by the use of 'co-citation cluster' technique.

Almost all research papers cite a few references from the literature. If two or

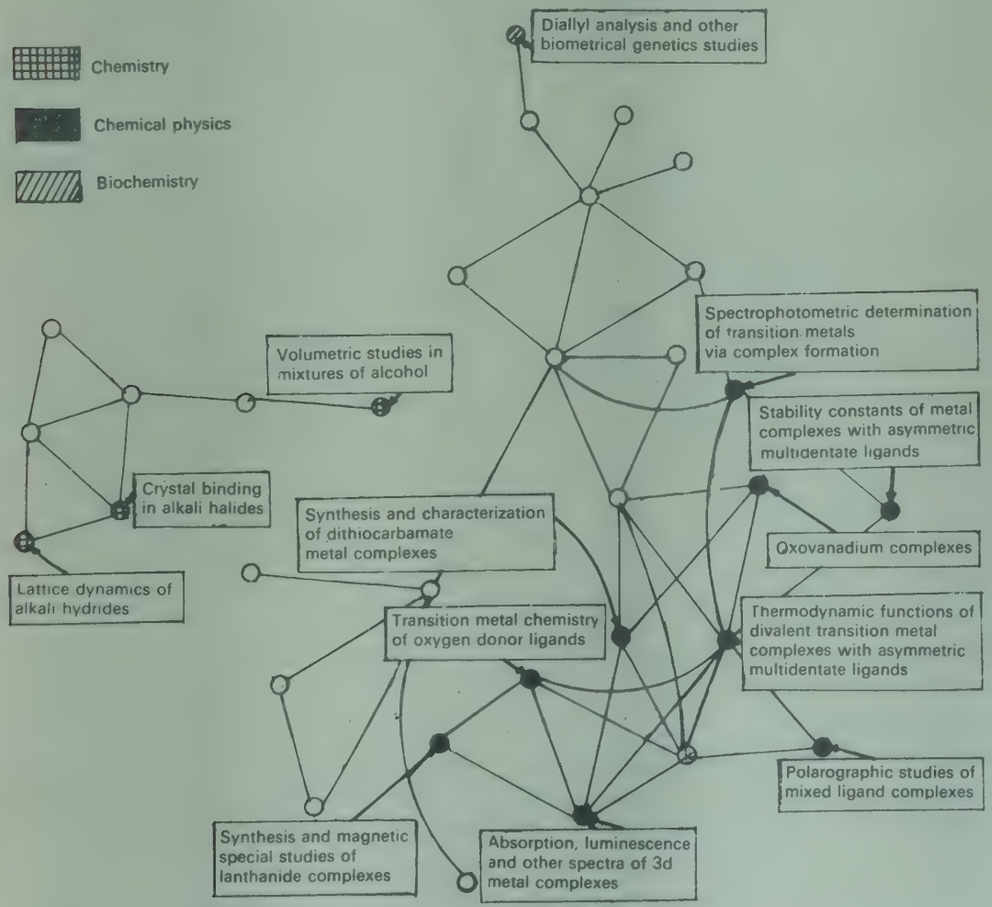
more documents are commonly quoted by two or more citing papers, it is reasonable to expect that the co-citing documents are cognitively related. Using a computer and appropriate software, the editor of SCI and colleagues have identified pairs of papers that have been co-cited above a threshold number of times. Using the clustering technique, they have identified the core papers in rapidly advancing fields, the principal investigators as well as how closely or distantly related research fronts are.

The speaker demonstrated how citation indexing, whose original purpose was to simplify information retrieval, has now become a working tool for the historian and sociologist of science.

The second lecture, which took off from where he ended the first, was entitled 'Science indicators in the advanced countries and the Third World as seen from the Science Citation Index'. Delivered at the CSIR Headquarters auditorium under the sponsorship of NISTADS, it was presided over by Prof. A. Rahman, NISTAD's director.

In this talk, SCI editor showed how citation analysis data could be used to measure the world distribution of publishable science done by different countries as well as their impact. Again illustrating with slides, he showed (based on 1978 SCI data) how India published a large number of papers for her to be rightly called the scientific superpower of the Third World. Half of the 16,000 Third-World articles in the 1973 SCI, 52% of the 22,000 Third-World papers in the 1978 SCI, and 48% of the 27,000 Third-World articles in the 1981 SCI were from India. Also Indian journals account for about 60% of the research papers published in all Third-World journals.

However, the average Indian research paper received very few citations in the world literature, a point, the speaker said, which should be looked into by India's science policy makers.


Chemistry
Chemical physics
Biochemistry
Diallyl analysis and other biometrical genetics studies
Spectrophotometric determination of transition metals via complex formation
Volumetric studies in mixtures of alcohol
Stability constants of metal complexes with asymmetric multidentate ligands
Crystal binding in alkali halides
Synthesis and characterization of dithiocarbamate metal complexes
Oxovanadium complexes
Lattice dynamics of alkali hydrides
Transition metal chemistry of oxygen donor ligands
Thermodynamic functions of divalent transition metal complexes with asymmetric multidentate ligands
Polarographic studies of mixed ligand complexes
Synthesis and magnetic special studies of lanthanide complexes
Absorption, luminescence and other spectra of 3d metal complexes

Clusters for which Indian articles amount to at least 25% of all citing articles

Through cluster analysis, Dr Garfield showed that Indian science is clustered in research fields that other Third-World countries have not significantly penetrated—biochemistry, physics, chemistry, and organometallic chemistry (Fig.)

Thus, in his second lecture, Dr Garfield proved that using citation index data, one could map the thrust areas of different countries, based on literature productivity and citation impact.

Dr Garfield at CCMB, Hyderabad

On an invitation from Dr P.M. Bhargava, Director, Centre for Cellular & Molecular Biology (CCMB), Hyderabad, Dr Garfield visited this laboratory on 13 November. Here the ISI president spoke on the use of citation index data for identifying emerging research fronts as well as to map scientific specialities. He also talked about the atlas of biochemistry and molecular biology which his institute had prepared as part of a larger atlas of science.

Dr Garfield indicated that it would soon be possible to enter the era of automatic ongoing classification using the cluster analysis technique.

Dr Bhargava discussed with Dr Garfield an ongoing DST-funded project on compiling publication and citation data on work published by India-born researchers. □

PROGRESS REPORTS

RRL-Trivandrum Annual Report: 1982

The major thrust areas in which Regional Research Laboratory (RRL), Trivandrum, carried out its R&D activities during 1982, according to the laboratory's annual report for that year, were: (i) spices, flavours and plantation products; (ii) special materials including alloys, composites, polymers and elastomers; and (iii) ceramics and glass. In all, 22 projects were pursued. A separate Ceramics and Glass Division was formed in view of the abundance of clay, sand and laterite in Kerala state. Processes relating to the production of white pepper powder by dry-grinding

method, and bottled coconut water, were released for commercialization.

Some of the important studies carried out in the area of foods were concerned with: chemical composition of the volatile oil of commercial grades of pepper, shelf-life of white pepper powder, determination of the critical moisture content for mold growth in black pepper, solar drying of coconut, preservation of coconut milk, effect of heat treatment on amylose content and cooking quality (stickiness) of plain cassava flour, and textural characteristics of wheat-cassava flour composition.

The laboratory made a number of articles using the natural fibres obtained from coir, sisal, banana and pineapple leaf. These included post-boxes [coir mat (11% by wt) and polyester resin], voltage stabilizer covers (banana-cotton fabric in polyester resin), and paperweights (banana-cotton fabric resin). A few laminates using pineapple leaf fibre, *kora* cloth with polyester resin were prepared and it was found that pineapple cloth up to 10 wt%, and *kora* cloth up to 30 wt%, could be easily introduced into the resin.

Under a project on enhancing the life of coconut thatch roof and increasing its fire retardancy, the laboratory developed a formulation which increased the life of the thatch roof from 12 to 30 months under exposure to natural weathering. Further modifications in the formulation were being attempted to extend its life to more than three years.

Utilization of coconut pith and shell powder was studied in extractive metallurgy, foundry composites and production of biogas. A hybrid composite of aluminium alloy-coconut shell with dispersions of 1-20 μm size SiC was developed.

Light-weight bricks were developed by using coconut pith as the ingredient for producing cellularity in the body of the brick. Also, chemical-bonded laterite bricks were developed by using a phosphate binder which did not require sintering but cured at 300-350°C in 3-5 hr.

A simple process was developed for beneficiating phosphogypsum—an industrial waste—to plaster, comparable to the commercial plaster.

Foam glass was developed by using waste cullet glass powder and foaming agents like calcium carbonate and vermiculite. Optimum conditions of heating, temperature, composition, etc. were worked out. The product had a good thermal insulating property with a sufficient load-bearing strength.

Thirty papers were published and 20 were presented at various conferences. □

Solid Waste Management in Developing Countries

Under its programme on publication of the state-of-the-art reports on subjects of national importance and relevance, Indian National Scientific Documentation Centre (Insdoc), New Delhi, has brought out a report on the title topic. This is the second in the series; the first one, devoted to Wind Energy, was brought out in 1982 [*CN*, 32 (1982), 134].

The publication, authored by A.D. Bhide and B.B. Sundaresan of National Environmental Engineering Research Institute, Nagpur, deals with the basic principles involved in the management of solid wastes, highlighting indigenous solutions appropriate to the conditions prevailing in developing countries. It covers aspects such as generation, storage, collection, transfer and transport, processing, and disposal of solid wastes. Some of the constituents of solid wastes can be recycled and reused—the reuse leading to overall economy. This has been stressed as the common theme throughout the book. Special emphasis is laid on legislation, planning and management aspects, which are essential to ensure an effective system. Presentation of the model designs and cost calculations makes the publication handy for the designers.

The publication (crown 4to. Pp. 222; price Rs 40/$ 12.50) can be had from: The Scientist in charge, Insdoc, 14 Satsang Vihar Marg, off S.J.S. Sansanwal Marg, Special Institutional Area, New Delhi 110067. □

CMRS Service to Industry

The Central Mining Research Station (CMRS), Dhanbad, has started a new quarterly titled 'CMRS Service to Industry'. The first issue (April-June 1983) has just been released. By apprising readers of the services rendered by the laboratory, the new quarterly aims to promote better understanding and more effective interaction between this laboratory and the industries it serves for the mutual benefit. According to the publication, the laboratory had on hand during the quarter 19 priority projects, 9 of them being of national importance. As many as 36 problems sponsored by industry, at an estimated cost of about Rs 17 lakh, were also taken up. The laboratory's earnings in the quarter amounted to about Rs 43 lakh. Copies available from: The Director, Central Mining Research Station, Barwa Road, Dhanbad 826001. □

CONFERENCE BRIEFS

Regional Meeting on Science for All

On invitation from Unesco, Dr D.C. Goswami of Regional Research Laboratory, Jorhat, attended, a regional meeting on 'Science for All' held at Bangkok in September. Attending the meeting as a resource participant, he presented a paper entitled Science for all—problems encountered and stra-

tegies needed in reaching the masses He also participated in a task force meeting held before the regional meeting.

In the discussion initiated through his paper to which a full session had been devoted, Dr Goswami presented the status of the non-formal type of science education and the role played by the voluntary science societies and other bodies of scientists in generating science awareness and science-mindedness. Many of Dr Goswami s suggestions are included in the work-plan to be adopted formally at the meeting of the education ministers of 31 countries of Asia and Pacific Region to be held early next year, reports the CSIR scientist. Dr Goswami was also one of the members of the planning group for this meeting, which held its session in July 1982 at Bangkok. □

PERSONNEL NEWS

Appointments Promotions

DR S.N. GHATAK

Dr S.N. Ghatak, Scientist EII, and head of the Biochemistry Division of Central Drug Research Institute (CDRI), Lucknow, has been appointed on promotion Scientist F (25 July 1983).

Dr Ghatak (born 19 July 1926) started his research career at Chemical Laboratories of CSIR, Delhi, in 1948, under Dr Salimuzzaman Siddique, FRS, on the chemistry of natural products. He has been associated with CDRI since its inception in 1951. He obtained his Ph.D. degree for his studies on the enzymes of pathogenic bacteria in relation to antigenicity and virulence. During 1964-65, he worked as a guest scientist of GDR Academy of Sciences with Prof. Werner Kohler at Institut für Medizinische Mikrobiologie, Jena, on group-specific streptococci and also on amyloid deposition in genetically controlled strains of mice.

Shifting his research interest to biochemical parasitology, from 1967 onwards, he and his group have studied the metabolic pattern of adult and developmental stages of human ascaris, filaria and hookworms, and used a few regulatory enzymes of the parasites as targets of chemotherapeutic attack. Visiting, in 1980, Institute of Parasitology, Giessen, and Bernhard-Nocht-Institut für Schiffs-und Tropenkrankheiten, Hamburg, Dr Ghatak studied recent developments in chemotherapy, immunology and biochemistry of parasitic diseases with special reference to filaria.

Dr Ghatak's current research interests include immunology, metabolism and neurochemistry of parasitic organisms. Has more than 100 research publications to his credit, and 13 students have obtained Ph.D. under his guidance.

* * *

SHRI P.S. NAGPAUL

Shri P.S. Nagpaul of National Institute of Science, Technology and Development Studies (NISTADS), New Delhi, has been appointed, on promotion, Scientist F (25 Oct. 1983).

A masters from Panjab University in mathematics with specialization in statistics, electricity and magnetism, Shri Nagpaul started his career as lecturer in mathematics and statistics. His association with CSIR started from 1962 when he joined National Environmental Engineering Research Institute, Nagpur, from where he moved over to Central Electronics Engineering Research Institute, Pilani (1966-73).

Transferred to CSIR Headquarters in 1973, Shri Nagpaul has diversified his interest from management and dissemination of S&T information to the planning and programming of research, studies on technology transfer, and science policy and planning. His research on the pattern and role of informal communication among scientists has been internationally acclaimed. During the past five years, he has been the project leader of 'International

Comparative Study on the Organization and Performance of Research Units', which is being carried out in several countries with Unesco cooperation. He has been assigned the responsibility of writing a book, to be co-published by Unesco, based on the results of this international study. His publications, numbering over about 25, have appeared in *IEEE Transactions of Engineering Management*, *Journal of Scientific and Industrial Research*, *Management in Government*, *Management Science*, *Research Management*, and *R&D Management*. As well as presenting papers in international workshops concerned with the organization and performance of research groups, he has given seminar talks, in several countries, on his special fields of interest.

* * *

DR B.K. RASTOGI

Dr B.K. Rastogi of National Geophysical Research Institute (NGRI), Hyderabad, has been promoted, on assessment, as Scientist EI (1 April 1983).

An M.Sc. in geophysics (1966) and a Ph.D. (1972) of Indian School of Mines, Dhanbad, Dr Rastogi is with NGRI since 1968. He has specialized in seismology including the study of reservoir-associated earthquakes, source mechanism of earthquakes, plate tectonics, and studies related to earthquake prediction.

Dr Rastogi worked during 1974 at International Institute of Seismology and Earthquake Engineering, Tokyo, on a Japanese government scholarship. He worked as a postdoctoral research associate at the Department of Geology, University of South Carolina, USA, from 1977 to 1980, and was associated as co-principal investigator with the NSF project on Search for precursory changes in amplitude ratio of P and S waves for Jocassee, South Carolina earthquakes . In 1981 he visited Kuwait University where he gave a series of lectures.

Dr Rastogi has published 30 papers and co-authored a book entitled 'Dams and Earthquakes . He is recipient of the Golden Jubilee Distinguished Alumini Award (1978) of Indian School of Mines, Dhanbad.

* * *

DR HARSH K. GUPTA

Dr Harsh K. Gupta of National Geophysical Research Institute, Hyderabad, has been promoted, on assessment, as Scientist EII (30 Dec. 1982). At present Dr Gupta is on lien to Centre for Earth Science Studies, Trivandrum. For his scientific attainments see *CN*, 29 (1973), 22.

* * *

At Publications & Information Directorate, New Delhi, the following have been promoted on assessment (with effect from the dates given in parentheses).

As Editor C

Smt. S.P. Mehta (24 March 1981); Shri M.L. Sharma (25 July 1981); Shri Kuldip Chand (28 April 1982), and Shri Ramesh Chand (21 Feb. 1983)

As Assistant Editor B

Shri R. Doreswamy, Shri A.K. Mandal, Shri Tarun Banerjee, Shri J.B. Dhawan, Shri P.S. Rawat, Dr B.C. Kashyap, Dr B.S. Aggarwal, Dr N.R. Mankad, Dr Chander Shekhar, and Shri Dalip Salwi (all from 1 Feb. 1981)

As Assistant Editor A

Smt. Meenakshi, Shri N.C. Mandal, Dr O.J. Chakre, Dr S.K. Bhasin, Shri Mohd. Khalil, Shri B. Subramanian, Smt. Diksha Bist, Smt. Madhu Bala, Shri P.D. Tyagi, Dr K.Y. Kavathekar, Dr K.K. Kakker, Dr (Smt.) Rekha Sharda, Dr D.S. Rao, Dr (Kum.) Sunita Aggarwal, and Shri S.C. Sharma (all from 1 Feb. 1981); Shri Rajiv Mathur (24 April 1981); Dr T.K. Mukherjee (20 May 1981); Dr (Smt.) Vatsala (28 May 1981); Dr (Smt.) Madhavikutty Haridas (15 July 1981); and Smt. Poonam Bhatt (17 Nov. 1981).

Also at PID, appointments on promotion include those of Shri D.S. Bhatanagar as Senior Sales & Distribution Officer and Shri Kishan Singh as Sales & Distribution Officer (both from 7 Nov. 1983).

* * *

At Regional Research Laboratory (RRL), Jorhat, the following have been appointed with effect from the dates given in parentheses: Dr B. Majumdar as Scientist E (25 Aug. 1983), Shri M.K. Gogoi as Scientist B (26 Sep. 1983), Dr R.N. Sharma as Scientist B (1 Oct. 1983), and Shri Paran Baruah as Scientist B (7 Oct. 1983).

Shri P.C. Tamuly has been promoted as Scientist C at RRL-Jorhat (14 Sep. 1983). □

* * *

At National Chemical Laboratory, Pune, the following have been promoted on assessment (with effect from the dates given in parentheses).

As Scientist EI [*Group IV*(3)]

Dr G.H. Kulkarni, Shri S. Balakrishnan, Dr V.G. Naik, Dr G.T. Panse, Dr A.K. Chatterjee, Dr R.N. Sharma, Dr Sobhan Ghosh, Dr V.R. Choudhary, Dr V.S. Patwardhan, and Shri R.S. Singh (all from 1 Feb. 1981); Dr M.V. Gokhale (18 Feb. 1981); Dr N.G. Karanth (20 Aug. 1981); Dr B.N. Joshi (1 Jan. 1982); Dr D. Chakrabarty (1 Jan. 1982); Dr R.V. Choudhary (13 Feb. 1982); Dr B.A. Nagasampagi (28 Aug. 1982); Shri N. Rajagopalan and Shri S.R. Srinivasan (1 Jan. 1983)

As Scientist C [*Group IV*(2)]

Shri B.G. Apte (1 May 1981), Shri Shankar Ghosh (2 June 1981), Dr (Smt.) S.A. Patwardhan (8 Aug. 1981), Shri Ishwar Chandra (26 Nov. 1981), Dr C.A. Chinchwadkar (10 Dec. 1981), Shri I.R. Unni (27 May 1982), and Shri K.N. Dixit (27 May 1982).

* * *

At Regional Research Laboratry, Jammu, Dr A.K. Gupta has been appointed Scientist B (16 Aug. 1983).

Transfers

Shri N.K. Gupta, Technical Officer B, has joined Regional Research Laboratory (RRL), Jammu, in the same capacity, on transfer from RRL-Jorhat.

COUNCIL OF SCIENTIFIC & INDUSTRIAL RESEARCH

SCIENTIST F AT NGRI

Advertisement No. 30 83

The Council proposes to appoint at National Geophysical Research Institute, Hyderabad, a Scientist F (scale of pay: Rs 2000-125/2-2500) in the areas of airborne geophysical surveys/ geochronology and isotope geophysics. Further details about the post and prescribed pro forma for sending curriculum vitae obtainable from Joint Secretary (Administration), CSIR, Rafi Marg, New Delhi 110001. Deadline for receipt of applications at the above address: 4 *January* 1984.

* * *

SCIENTISTS F AT CEERI AND CDRI

The Council proposes to appoint one Scientist F (scale of pay: Rs 2000-125/2-2500) at Central Electronics Engineering Research Institute (CEERI), Pilani and three Scientists F (scale of pay: Rs 2000-125/2-2500 or Rs 2250-125/2-2500-EB-125/2-2750) at Central Drug Research Institute (CDRI), Lucknow. The respective discipline/area and the deadline for sending curriculum vitae are:

(i) Post at CEERI (*Advt. No.* 32/83): Electronics—2 *February* 1984;

(ii) Posts at CDRI (*Advt. No.* 33/83): Post No. I—Organic or pharmaceutical chemistry; Post No. II—Organic chemistry/chemical technology/ chemical engineering or pharmaceutical sciences; and Post No. III—Pharmaceutics/medicinal chemistry, pharmacodynamics or related discipline—18 *January* 1984.

Further details and prescribed pro forma for sending the curriculum vitae obtainable from: The Joint Secretary (Administration), CSIR, Rafi Marg, New Delhi 110001. □

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VOL 33 NO 24 30 DECEMBER 1983

Edible Fungi: Science and Cultivation Technology

An international symposium on the title topic was held at the Srinagar branch laboratory of Regional Research Laboratory, Jammu, from 9 to 11 September. As many as 111 papers were presented at eight sessions devoted to: Cultivation technology of *Agaricus bisporus* (16), Cultivation technology of other edible fungi (30), Mushroom disease and pest problems (13), Nutritional and medicinal value (12), Fruiting of larger fungi (10), Biochemistry and physiology (9), Cytology and genetics (5), and Taxonomy (16). Amongst the contributors were scientists from Pakistan, Mexico, Taiwan, Mauritius, UK, and France.

Dr J. Delmas, President, International Society of Mushroom Science, mentioned, in his keynote address, the future prospects for mushrooms. According to him, *A. bisporus* would retain a leading position among the cultivated species for a long time to come. In view of the nutritive and medicinal value of edible fungi, he foresaw a great future for the ever-increasing number of such species in various parts of the world. In addition to *A. bisporus*, other saprophytic species like oyster mushroom, *shiitake*, and paddy straw mushroom would have great future. Taking into account a recent breakthrough in the cultivation of some ectomycorrhizal species of edible fungi like truffle and *Boletus*, Dr Delmas predicted progress in the cultivation of more species of that group as a distinct possibility. The number of cultivated species would also increase as a result of advances in the understanding of ecological and genetical basis of edible fungi. Various regions of the world would adopt different technologies of culture depending upon their level of development. Dr Delmas predicted that the production of fresh mushrooms in the world in the year A.D. 2000, would be around 2 million tonnes per annum. He also envisaged a prominent role for national and international professional bodies in the diffusion of knowledge pertaining to the cultivation of mushrooms.

Dr C.K. Atal, Director, RRL-Jammu, in his welcome address, traced the growth of mushroom industry in the state. He described how, starting from survey and identification of fleshy fungi of the region in collaboration with Royal Botanic Gardens, Kew (UK), his laboratory had developed cultivation technologies for *Agaricus bisporus* and *Pleurotus flabellatus*. He informed the gathering that there was a proposal to establish a modern mushroom production unit at the Srinagar laboratory.

The symposium was inaugurated by the Governor of Jammu & Kashmir, Shri B.K. Nehru, who in his address complimented the laboratory for introducing mushroom cultivation in that region. This work, he said, had benefited a large number of growers by supplementing their income and had made available fresh-button mushrooms twice a year. He called for developing less capital-intensive technology and hence suitable for the common man. He also stressed the need to bring increasing number of edible mushroom species, especially morel (Gucchi), under commercial culture.

Shri Nehru also released a book entitled *Cultivated Edible Mushrooms*, brought out by the laboratory.

CSIR News wishes its readers a happy new year

Cultivated Edible Mushrooms

This publication (author: T.N. Kaul) gives information, mainly, relating to the cultivation of following edible mushrooms: *Agaricus bisporus*, *Volvariella volvacea*, and *Pleurotus* spp. It also gives information on post-harvest technology, marketing, economics, nutritive value, etc. Other varieties of mushrooms covered include: *Agaricus bitorquis* and *Lentinus edodes*. A full chapter is devoted to the future growth (of mushrooms) in India.

The publication (royal 8vo: pp v + 53) is obtainable from: The Director, RRL, Jammu-Tawi 180 001. □

Cultivation, Improvement and Utilization of Hops: Seminar

The deliberations at a national seminar on Cultivation, Improvement and Utilization of Hops revealed that the production of hops in the country was sufficient, quantitatively as well as

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National Physical Laboratory: A Feature ... 186

qualitatively, to meet the requirements of breweries, in the processed and in other forms. Held 21-22 September at the Srinagar branch laboratory of Regional Research Laboratory (RRL), Jammu, the seminar recommended a ban on the import of hops so that no item under the botanical name *Humulus lupulus* or any hop product could be imported.

The seminar also recommended that export marketing facilities be explored and that liberal incentives, as provided to such-like commodities, be made available for this purpose. Another recommendation was that vigorous R&D efforts were needed to be continued on the development of improved agro-technology and post-harvest technology.

The deliberations also revealed that RRL-Jammu was mainly responsible for evolving and popularizing the high α-acid hop varieties. The laboratory had also started releasing high-aroma varieties comparable with the best in the world and accepted by leading breweries in the country. One aroma variety introduced from USA was already under cultivation on a sizeable area in the Kashmir Valley.

Prof. A. Ahmad, Vice Chancellor, Sher-e-Kashmir University of Agricultural Science and Technology, who inaugurated the seminar, appreciated in his address the efforts made by this CSIR laboratory in introducing hops in the valley. He called for increasing the yield of hops per unit area by educating farmers in the latest agro-technologies developed by the laboratory through a well-organized extension wing so that development of this industry could be vertical instead of horizontal. He also suggested that the possibilities of using hops in bakery and medicines, besides beer, be explored.

Dr C.K. Atal, RRL's director, in his welcome address traced the history of hops cultivation in India. He explained how Indian Council of Agricultural Research had collected germplasm of hops from all parts of the world and how the scientists of his laboratory, with the adoption of a proper approach, had been successful in commercial cultivation of this highly specialized crop in Kashmir Valley and some parts of Himachal Pradesh. He also informed the participants that efforts were under way for finding out some export market. This laboratory had evolved four aroma varieties which had been approved by the Brewery Association and would be released for commercial cultivation in a phased manner, added the RRL director.

Shri A.K. Sen, Industrial Adviser, Directorate General of Technical Development, New Delhi, stated that during last 2-3 years the central government had taken considerable interest in improving the lot of hop growers.

Shri R.S. Rana, Director of Horticulture, Himachal Pradesh, suggested that there should be an Agmark or ISI standard for hops. Dr Atal offered to provide analytical facilities for this purpose. Some speakers expressed the view that a corporation for tackling marketing problems of hops be formed or the State Trading Corporation be asked to buy the produce and market it to breweries. Some others desired that an all India hops association be formed to create better interaction between growers, brewers and R&D institutes. □

National Physical Laboratory: Science Week & A Resume of its Activities and more Recent Contributions

One of the earliest links in the chain of national laboratories to be set up, in 1950, under CSIR, National Physical Laboratory (NPL), New Delhi, is the nation's custodian for the establishment and maintenance of national standards of measurements—a function which is a primary and statutory responsibility of this national laboratory. It is, however, equally concerned with the generation of physics-based technologies, spread as its areas of interest are in materials science, radio and space physics, high-pressure technology, and a large number of other areas in physics of both basic and applied nature.

What follows is a brief resumé of more recent accomplishments of this national laboratory, which celebrated a 'science week' from 12 to 18 November, in the service of the nation.

The 'science week' started on 12 November with the Krishnan memorial lecture by the 1977 chemistry Nobelist Prof. I. Prigogine, who spoke on 'Thermodynamical aspects of field theory'. Get-togethers with industry, and with research and educational institutes and government agencies, and special lectures by Prof. A. Bose on 'Cryogenics in the service of the nation, by Prof. A.R. Verma on 'Metrology through ages', by Prof. V.G. Bhide on 'Tailoring of surface of materials for the required specification', and G.C. Jain memorial lecture by Prof. K.L. Chopra on 'Tailored micromaterials' were some of the highlights, besides a press conference, of the celebration.

A feature of the science week, which the NPL's director Dr A.P. Mitra highlighted at a press conference on 14 November, is that this CSIR laboratory had invited bright young students—both girls and boys—to spend the week with it to enthuse them in research so that they could plan their research career. These students were the winners of the national contest, following district-level and state-level contests, in science essay-writing (a physics topic being chosen this year) conducted by the National Council of Science Museums. The future of science, as Dr Mitra underscored in his dialogue with the press, depends on young scientists and hence his accent on youth.

20 JAN 1984

Prof. Prigogine being presented a bouquet by Dr A.P. Mitra, Director, NPL, at the time of the Krishnan memorial lecture delivered by him on 12 November

STANDARDS OF MEASUREMENTS

NPL has been entrusted with the statutory responsibility of establishment, custody and maintenance of the 'national standards of measurements' representing the 'units' related to all physical parameters according to Le Systemé International d'Unites (SI) (except ionizing radiation maintained at Bhabha Atomic Research Centre, Bombay). This role is quite distinct from that of Indian Standards Institution (ISI), which formulates 'documentary standards'—standard specifications for a variety of products, devices, and materials for civilian uses. However, the roles played by the two institutions are complementary, and are supplemented by the role played by the Directorate of Weights and Measures, which is concerned with legal metrology. NPL's expertise is availed of by ISI in the drafting of specifications.

While the national standards of measurements maintained at NPL till 1970 were material artefacts such as prototype metre (unit of length; accuracy 1 part in 10^8) and quartz crystal oscillator as time and frequency standard (accuracy 1 part in 10^8). Over the last decade, however, the laboratory has changed over to the quantum approach in tune with trends in advanced countries. Currently, the 'second' is realized through a bank of cesium atomic standards; 'metre' is based on krypton-86 with significant developments being made on stabilized He-Ne laser; 'farad', the unit of capacitance, has been realized through a calculable capacitor linked with the length standard. Work on the realization of 'volt' through Josephson effect is in progress.

Simultaneously with the increase in the accuracy of the national standards, this CSIR laboratory has also been making efforts in extending the range of measurements wherever gaps exist or where new users have come up. Thus, keeping in view the growing requirements of calibration of electronic instruments, primary standards and calibration facilities for a large number of electronic parameters have been established and these cover the frequency range from DC to 18.0 GHz. It is planned to extend them up to 40 GHz in a few years.

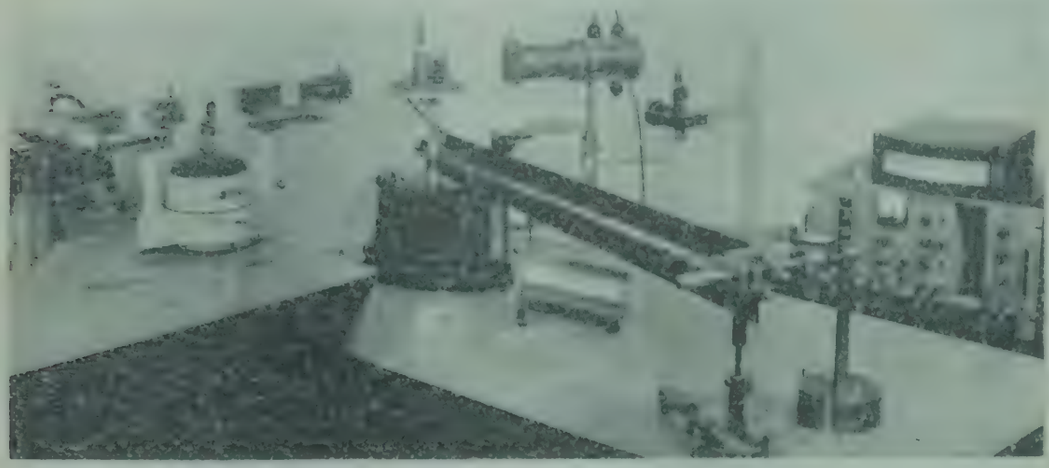
The laboratory has received from PTB, FRG, one 1-mega-Newton (MN) force calibration machine which uses a lever multiplication system of 10 Pa deadweight of 100 kilo-Newton (kN). The country's requirement demands calibration facilities up to 5 MN. A machine capable of calibrating force-measuring devices up to 500 kN using hydraulic multiplication has been already developed. The laboratory is trying to extend this range to 1 MN. A new and exciting activity in which PTB is collaborating with NPL is the realization of the Josephson volt standard. NPL is establishing, with UNDP support, standards and calibration facilities for pressure (1 bar to 10 kbar) and vacuum (down to 10^{-7} torr).

In changing over from the artefact concept to quantum approach, the frequency standard assumes a critical role as, ultimately, all standards will be related to the frequency standard through a number of fundamental constants. The time-keeping accuracy has been improved from a few milliseconds to a few microseconds over the last decade.

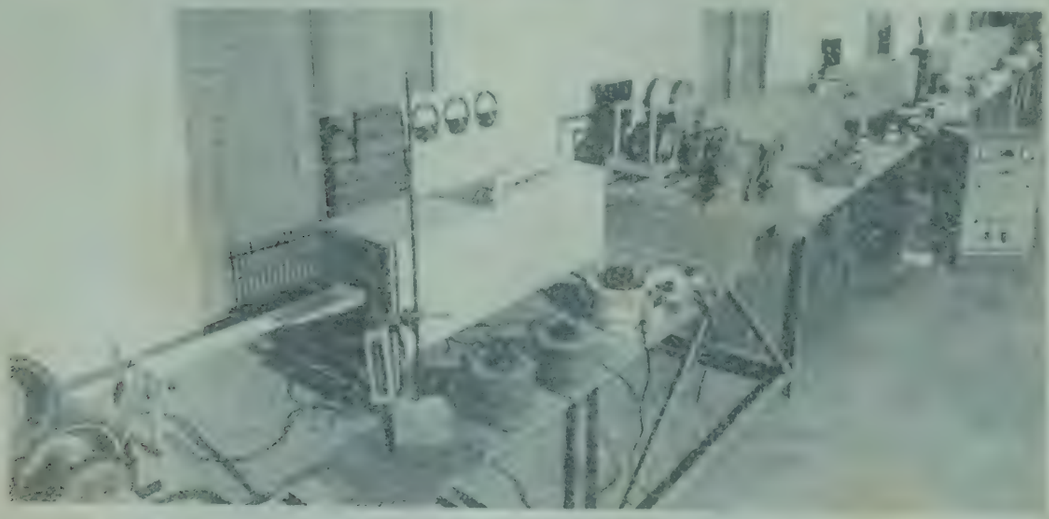
The laboratory broadcasts time and frequency signals under the call-sign 'ATA' at three frequencies (5, 10, and 15 MHz) for 12 hours a day on all the working days and also for a limited period on holidays for the benefit of the Defence, Posts & Telegraphs, All India Radio, Overseas Communication Service, Indian Space Research Organisation, etc. The only such facility in this part of the globe, this caters to the needs of other countries in the East and South-East Asia also.

A recent achievement has been the successful use of the TV broadcast, both via landline and via satellites, for precise time dissemination. Time transfers have also been achieved through the French-German satellite Symphonie, and the Indian experimental satellite APPLE, thus calibrating the atomic clocks at Ahmedabad and Madras. A two-way time comparison via Symphonie was performed between NPL and PTB and the atomic clocks were intercompared to within 10 ns precision. Trial experiments have been conducted with INTELSAT,

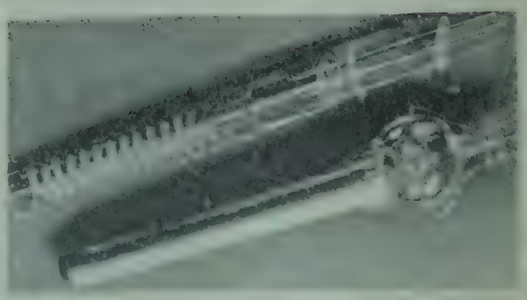
The national standard of length based on iodine-stabilized He-Ne laser developed at NPL. The frequency stability achieved is a few parts in 10^{11}. This has replaced the earlier national standard of length based on the ^{86}Kr lamp.



The triple crystal X-ray diffractometer developed at NPL for measurement of diffuse X-ray scattering from nearly perfect crystals at a very high resolution, and for recording diffraction curves (rocking curves). With this system, it has been possible to make detailed investigation of diffuse scattering close to the reciprocal lattice point of several silicon single crystals. Even small changes in the thermal history of the specimen could be clearly observed and characterized.



Bench scale set-up for the development of continuous carbon fibres. The fibres undergo various stages, viz. pre-stretching (achieved by differential speeds on the two sides of the pre-stretching furnace), pre-oxidation, and finally carbonization at 1000° C HTT. The whole set-up has been designed and fabricated at NPL.



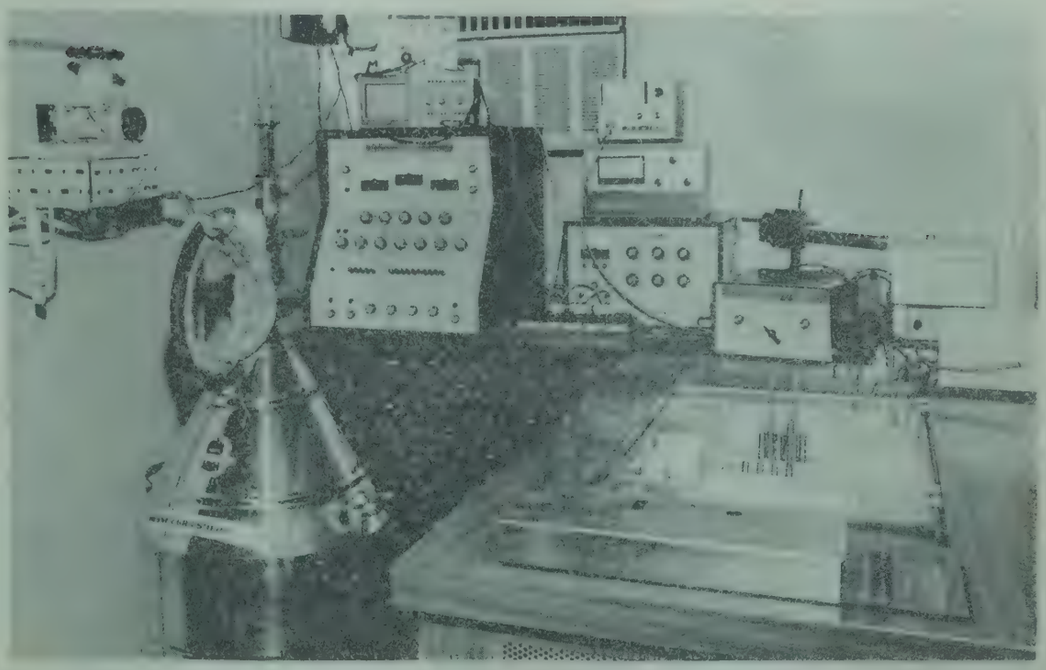
A number of standard platinum resistance thermometers have been developed for the temperature range 630°C-259°C. One such thermometer is the capsule-type platinum resistance thermometer for the range 0°-259°C (shown here).

Also, ceramic enclosed sensors for industrial platinum resistance thermometers have been developed and the know-how for their construction has been released to four parties.

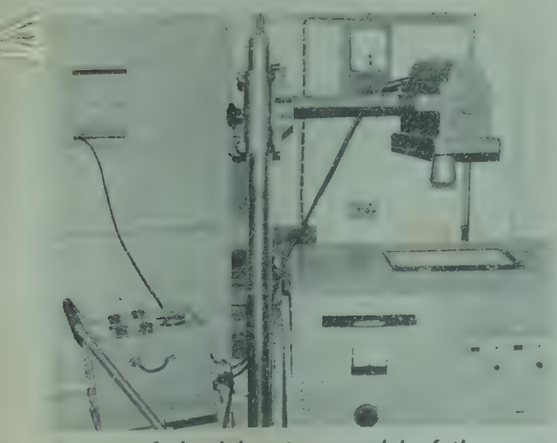
Xero-radiograph of a hand taken with the NPL-developed machine. In some cases, these xero-radiographs have been adjudged by the medical doctors to be even superior to the conventional radiographs.

Test rig for measurement of thermal performance of flat-plate solar collectors.

NPL has established microcalorimetric technique for microwave power measurement at 10.0 GHz. This system uses thin film bolometer mounts developed at the laboratory (maintained at constant temperature in an oil-bath), and serves as the primary standard microwave power.



Part of a set-up for the voltage standard based on Josephson tunnelling phenomenon. Microwave-induced steps of 1 mV have already been realized, and attempts are now being made to raise this to 100 mV by using an array of Josephson tunnel junctions. Work on development of such tunnel junctions is also on hand.



A part of the laboratory model of the xero-radiography machine developed by NPL and now under prototype fabrication before release to the industry. The technique provides a faster, cheaper and a more convenient method for routine medical and industrial inspection for X-ray images than the conventional radiology. Preliminary studies have established the feasibility of making either a plain paper copy, a translucency or a photograph from the photoreceptor plates of an X-ray radiograph.

Cryoprobes using N_2O/CO_2 developed at the NPL have been effectively used for treatment of cataract and retinal disorders, etc., and have also been successfully tried for treatment of medium-size tumours—both benign and malignant. These can find application in gynaecology, dermatology, neuro-surgery, surgery in the ENT region, etc. These were a source of great attraction for the school children who visited the laboratory during the 'science week'.

A balloon-borne payload for the measurement of stratospheric positive and negative ion densities developed at NPL was successfully flown on 23 March 1982 at 0028 IST from the national balloon facility, Hyderabad. The balloon ascended at the rate of 200 m/min and reached an altitude of 33 km.

and a regular time dissemination service, on an experimental basis, is to be started soon with INSAT IB.

NPL has also been serving as an elected member of the Consultative Committee for the Definition of Second and as consultant to the Commission on Time of the International Astronomical Union.

International intercomparison of standards: To ensure that a nation's standards of measurement are in accord with those of other countries, intercomparison through a travelling standard is necessary. Since 1977 NPL has been associated with the Asia/Pacific Metrology Programme initiated by the Commonwealth Science Council. During the last two years, travelling standards of mass, temperature, time and frequency, optical radiation, length, DC voltage, and acoustics have gone around about a dozen participating countries in the region. NPL was the coordinating laboratory for DC voltage intercomparison, which was completed early this year. The results of intercomparison have shown that the national 'volt' standards of most of the countries agree within $\pm 2\,\mu V$, Australia and India having agreement within $\pm 0.5\,\mu V$.

As a part of A/PMP, NPL has rendered advisory and consultancy services to Sri Lanka, Bangladesh, Scychelles, and Mauritius, besides holding two regional workshops at NPL in 1979 and 1980.

The responsibility for regional coordination of the A/PMP for the period 1983-86 now rests with India (NPL)—the third country to have had this privilege so far.

National calibration service: Under the Government of India's programme on 'National Coordination of Testing and Calibration Facilities' NPL operates at the apex (echelon I) level by providing calibration service at the highest level of accuracy.

MATERIALS

The materials research group of this laboratory has the credit for putting ferrites and piezoelectric ceramics on the industrial map of India, leading eventually to the establishment of the Central Electronics Limited—the first Government of India undertaking established as a result of R&D activities of a CSIR laboratory.

Development, on a laboratory scale, of carbon fibres which are known to possess fascinating properties for use in making fibre-reinforced composites for a variety of applications has been a high point of research in this area. The laboratory has also been working on pitch coke to substitute it for petroleum coke, on glassy carbons, and on aviation-grade brushes.

Semiconducting materials is a thrust area of materials research. Silicon prepared at NPL has also been demonstrated to yield polycrystalline silicon suitable for terrestrial solar photovoltaic application. Processes for growing single-crystal silicon by Czochralski method and for fabricating silicon power rectifiers are now with industry. The laboratory has also set up a pilot plant for production of black and white TV-grade phosphors with support from National Research Development Corporation of India. Monochrome TV phosphors of quality meeting the specification needs of Bharat Electronics Limited, Bangalore, have been batch-prepared and supplied for user trials.

Ultrasonic transducers and materials for a wide variety of applications have resulted from researches in ultrasonics. A sonic weighing balance with a sensitivity of about 3% for the use by blind persons, an A-scan ultrasonic ophthalmoscope for medical diagnostic applications and transducers of high power for air-borne applications are but a few examples of successful end products in this area.

Other materials on which the laboratory has been working include a number of materials of commercial interest such as liquid crystals (both monochrome and coloured), electrochromic display materials, chalcogenides, high-quality ceramics like beta-alumina, ionic conductors, zinc oxide varistors, and infrared materials.

Besides establishing facilities based on imported equipment, the laboratory has developed many sophisticated equipment for preparation and characterization of materials. Some of the major contributions are development of (i) hot-axle detection boxes based on infrared sensors, for the Indian Railways, (ii) X-ray diffraction topography camera similar to a Lang camera, (iii) microfocus X-ray generator, (iv) 1 to 3 μm infrared spectrophotometers, (v) a triple crystal X-ray diffractometer, (vi) X-ray stress analysis camera, (vii) a low-angle X-ray scattering camera, (viii) photoacoustic spectrometer, and (ix) Mössbauer spectrometer.

RADIO AND SPACE RESEARCH

The activities in the areas of radio science at NPL, which began about 25 years ago, make an impressive record of work in an area which has a national as well as international focus.

One of the major programmes in which the Radio & Space Research group is currently participating is the Indian Middle Atmosphere Programme (IMAP), which is part of the global effort directed towards the study of the earth's atmosphere extending from the tropopause to the lower thermosphere (approx. 15-100 km), the least explored and understood part of the atmosphere which holds a key to the global climatic phenomena.

A Regional Warning Centre, which receives and disseminates a wide variety of solar and geophysical data needed for operation of radio communication systems and for special experiments relating to the sun and our environment, is an infrastructure of international utility.

HIGH-PRESSURE TECHNOLOGY

High-pressure technology is an exciting new area at NPL. A pilot and

demonstration plant in metal-forming and material synthesis was established at the laboratory in mid-70s with UNDP support. In materials synthesis the major thrust has been in the area of superhard materials which are synthesized at pressures of 55-70 kbar and temperatures of 1400-1600°C. Industrial diamonds and cubic boron nitride compacts have been produced in the laboratory by using a 200-tonne cubic press. Efforts are under way to develop production technology for these materials on a 1000-tonne press by using a 'belt'-type die-and-punch assembly. Simultaneously, a collaboration agreement is being negotiated with an industrial firm to commercialize the process.

The major fields covered in the metal-forming area are hydrostatic extrusion of metals and alloys, shear-spinning of tubes, cold-forging of steel and hot extrusion of superalloys. A 80-tonne laboratory machine and a 850-tonne pilot hydrostatic extrusion machine are used to extrude tubes, shapes and sections in ferrous and nonferrous materials. Of special interest is the extrusion of helical fins and interval splines. Shear-spinning is a new technology developed at the laboratory to produce thin-walled high-dimensional tolerance tubes in titanium and superalloys like Inconel, Monel, Incoloy, and stainless steels.

The 500-tonne press is also being utilized to develop the technology of cold-forging of automobile components. The process is known to be cost-effective, saving on materials and energy. NPL is also collaborating with Bharat Heavy Electricals Ltd to prepare a techno-economic feasibility report for putting up a production plant for the manufacture of copper-nickel tubes based on NPL's know-how.

Cryogenics and Superconductivity

In cryogenics research, a long tradition in NPL, an excellent infrastructure has been built up for production of liquid air, liquid nitrogen, and liquid helium.

Cryoprobes for surgical applications, such as in cataract, retinal detatchment, glaucoma, ENT, dermatology and for malignant tumours have been developed. Super-insulated cryo-containers of 20-litre capacity with an evaporation loss of 2% per day, i.e. a holding time of 50 days, have been developed for freezing the bull semen for the national cattle breeding programme and for other applications such as in research and hospitals, etc.

The laboratory has suggested that exchange interactions of antiferromagnetic type in the conduction band are responsible for superconductivity, rather than phonons as suggested by the Bardeen, Cooper and Schrieffer theory. This model has stimulated interest both at the theoretical and the experimental fronts in a number of countries. A few attempts on the basis of the new model for enhancing the critical temperature in some superconducting compounds have been promising.

Solar Energy

Solar energy activity in NPL has also a long history. Work in this area was resumed in 1975 in the context of the deepening energy crisis. Two separate activities exist: (i) thermal and (ii) photovoltaic. In the former, the laboratory has been concentrating on the development of both flat- and concentrating-type of collectors, of selective coatings, and of various solar thermal systems such as water-heating systems—both domestic and industrial—solar dryer, solar space-heating system, etc., and setting up of national test facilities.

Technology for fabrication of thin-film CdS: Cu_2S solar cells has also been developed, and facilities for laboratory-level batch-production of these cells have also been established. The conversion efficiency of solar cells ranges between 5 and 6%. These cells have shown stability over a period of more than four years. Attempts have also been made to develop all electroplated CdS: Cu_xS solar cells to reduce cost.

Electrostatic, Display and Thin-Film Devices

NPL has developed electrophotographic machines for making plain-paper copies from documents, which are now widely available in the market. The development of technology and materials used are entirely indigenous. Work is under way on: (i) xero-radiography, which provides a faster and cheaper method for routine medical inspection of X-ray images compared to conventional radiology, and (ii) electrostatic dust collectors for removing particulate matter from ambient air.

Expeditions to the Antarctica

This CSIR laboratory has participated in the two expeditions to the Antarctica and is also participating in the third one. In the first expedition to the Antarctica in 1981-82, several radiowave propagation and communication studies were carried out by the NPL's scientists. In the second expedition held last winter, the experiments contributed by NPL related to: studies in communication and propagation of radiowaves through the ionosphere; radio meteorology measurements using an automatic weather station for surface-based duct studies relevant to marine microwave communications; air-sea interactions; and energy exchange.

Basic Researches

All the work in the standards, radio science and other fields is necessarily backed up by sound basic research, some pieces of work winning for NPL international recognition. The laboratory's best contributions have, expectedly, come from groups which have competence in basic research in physics.

There are exciting possibilities in xero-radiography, in medical ultrasonics, in the use of carbon fibres in bone surgery, and in applying cryogenic techniques to surgery. In these, there are two main requirements: the equipment development and standardization, in both of which, especially the latter, NPL's role could be critical. □

PERSONNEL NEWS

Appointments Promotions

DR J.N. KANSAL

Dr J.N. Kansal, Public Relations Officer, CSIR Headquarters, New Delhi, has been promoted, on assessment, as Deputy Adviser (Public Relations Officer) EI (20 June 1981). An M.A. in economics from Agra University and Ph.D. in economics/industrial statistics from Meerut University, he also holds a diploma in mass communication from Rajendra Prashad College of Mass Communication, New Delhi, and has passed research methodology courses in social sciences from Institute of Economic Growth of Delhi University. Joining Central Glass & Ceramic Research Institute, Calcutta, as junior research fellow in 1960, Dr Kansal was with *Science Reporter* from 1967 to 1969 and was promoted as Public Relations Officer in 1969.

As Public Relations Officer with CSIR, he has organized many science exhibitions in India and abroad, visiting Bulgaria, Yugoslavia and USSR in connection with the organization of exhibitions on behalf of CSIR. □

Honours & Awards

DR S.C. PAKRASHI

The election of Dr S.C. Pakrashi of Indian Institute of Chemical Biology (IICB), Calcutta, as fellow of Indian National Science Academy has been

announced [*CN*, 33 (1983), 168]. This honour is in recognition of his outstanding contribution in the field of the chemistry of natural products, particularly the minor components.

Dr Pakrashi has been with IICB since 1959. His major contributions, besides those on *Rauvolfia* alkaloids and their structure-activity relationship, relate to: (i) discovery of a new and only source (*Alangium lamarckii*) of emetine group of alkaloids other than *ipecacuanha*; (ii) discovery of a series of a new type of pyrodobenzoquinolizine alkaloids as well as Bharatamine, a unique protoberberine alkaloid biogenetically derived from loganine, besides structure determination and synthesis of a host of new isoquinoline alkaloids isolated from *Alangium lamarckii*; (iii) arborinol, a new triterpene type and new simple quinazolinone alkaloids ex. *Glycosmis arborea* of considerable biogenetic interest; (iv) new and rare 3-amino steroidal alkaloids and spirostanes from *Solanum* spp.; (v) new oxindole alkaloids from *Vinca* spp.; (vi) biologically important steroids and new germacranolides and diterpenoids ex. *Anhydra fluctuans*; (vii) new type of sesquiterpene and a number of phenanthroids, one of which is a highly potent anti-fertility agent, from *Aristolochia indica*; (viii) abnormal metal hydride reactions and transformations of 4-quinazolinones; (ix) commercially feasible synthesis of quebrachamine and rhazidine having potent hypertensive and anti-arrythmic activities respectively and other indole alkaloids, for example vincatine and vincadifformine.

Born 1 February 1930, Dr Pakrashi obtained his M.Sc. (1950) and Ph.D. (1954) from the Calcutta University. He has worked with Prof. (Smt.) Asima Chatterjee, Prof. Carl Djerassi (Wayne University, Detroit), Prof. R.B. Woodward, N.L. (Harvard University), and Prof. D.S. Tarbell (University of Rochester). Revisiting USA as exchange scientist under Indo-US Scientists Exchange Programme in 1973, he worked with Prof. K. Biemann at MIT, Cambridge, Massachusetts.

Dr Pakrashi has 130 original publications, 16 review papers and articles and 6 patents to his credit; 14 students have received Ph.D. under his guidance. He is a recipient of Basudev Memorial Award of the Indian Chemical Society for 1967. He has participated in many international symposia. He is a life member of Indian Chemical Society and of Indian Association for the Cultivation of Science.

* * *

SHRI R.N. SHARMA

Shri R.N. Sharma, project coordinator of the Periodicals Division of Publications & Information Directorate, New Delhi, has been

honoured with the fellowship of the Society for Information Science. This honour comes to him in recognition of his valuable contributions, over the past 30 years, to the cause of primary communication in science and technology and to technical writing and editing. The award was presented to him by Dr Jagjit Singh, the well-known science writer and Kalinga Prizewinner, at the annual convention of the society held on 24 December in New Delhi. □

ANNOUNCEMENTS

International Workshop on Energy Conservation in Buildings

The Central Building Research Institute (CBRI), Roorkee, is organizing, on 2-7 April 1984, an international workshop on Energy Conservation in Buildings.

The workshop will review the present state of art and will identify future perspectives of R&D with a view to recommending measures for energy conservation in buildings as relevant to developing countries.

Further details obtainable from: Dr B.K. Saxena, Organizing Secretary (IWSOECIB), CBRI, Roorkee 247 667. □

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